

A FISH AND WILDLIFE RESOURCE INVENTORY
OF THE COOK INLET-KODIAK AREAS

VOLUME 1 - WILDLIFE

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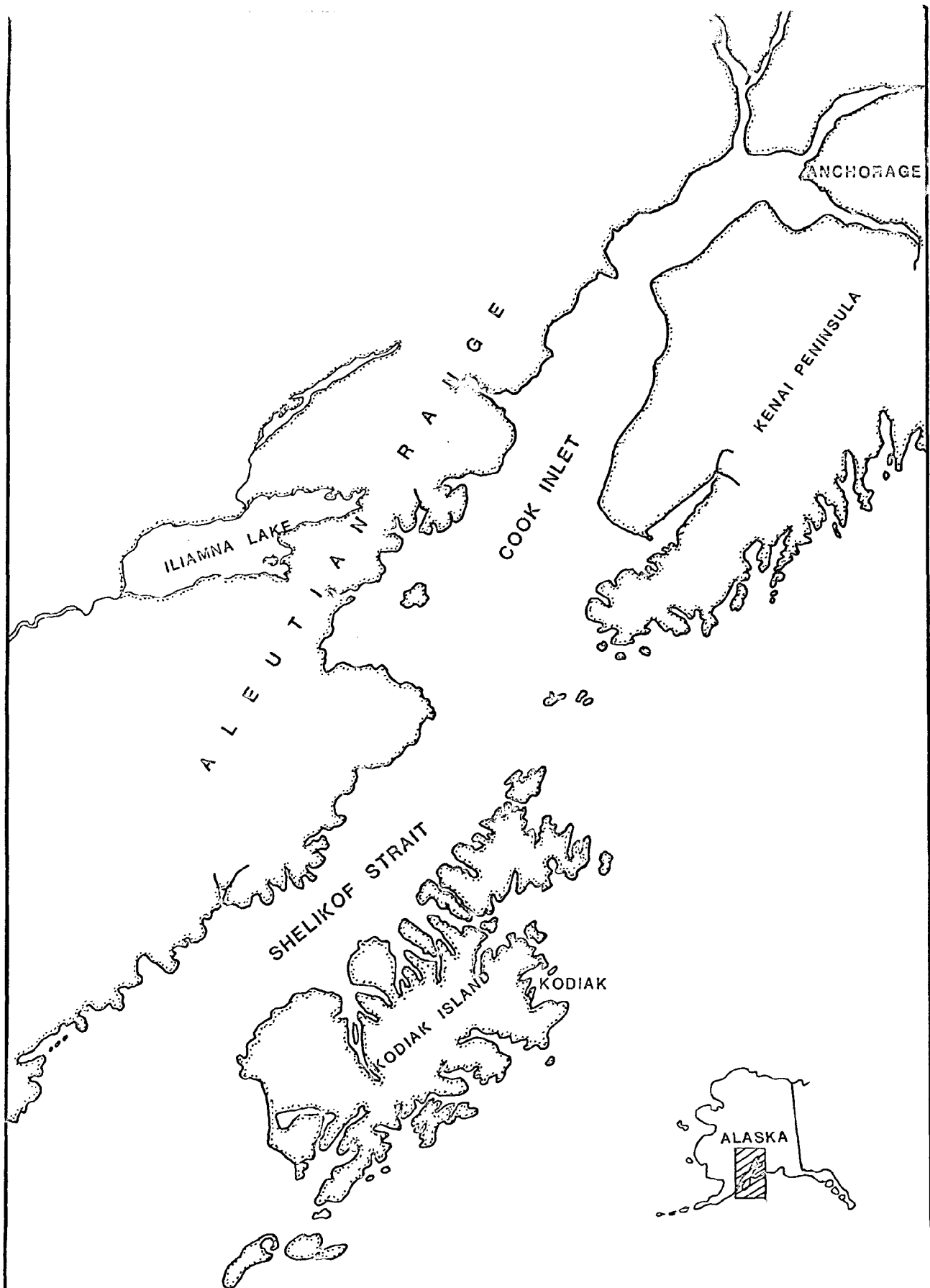
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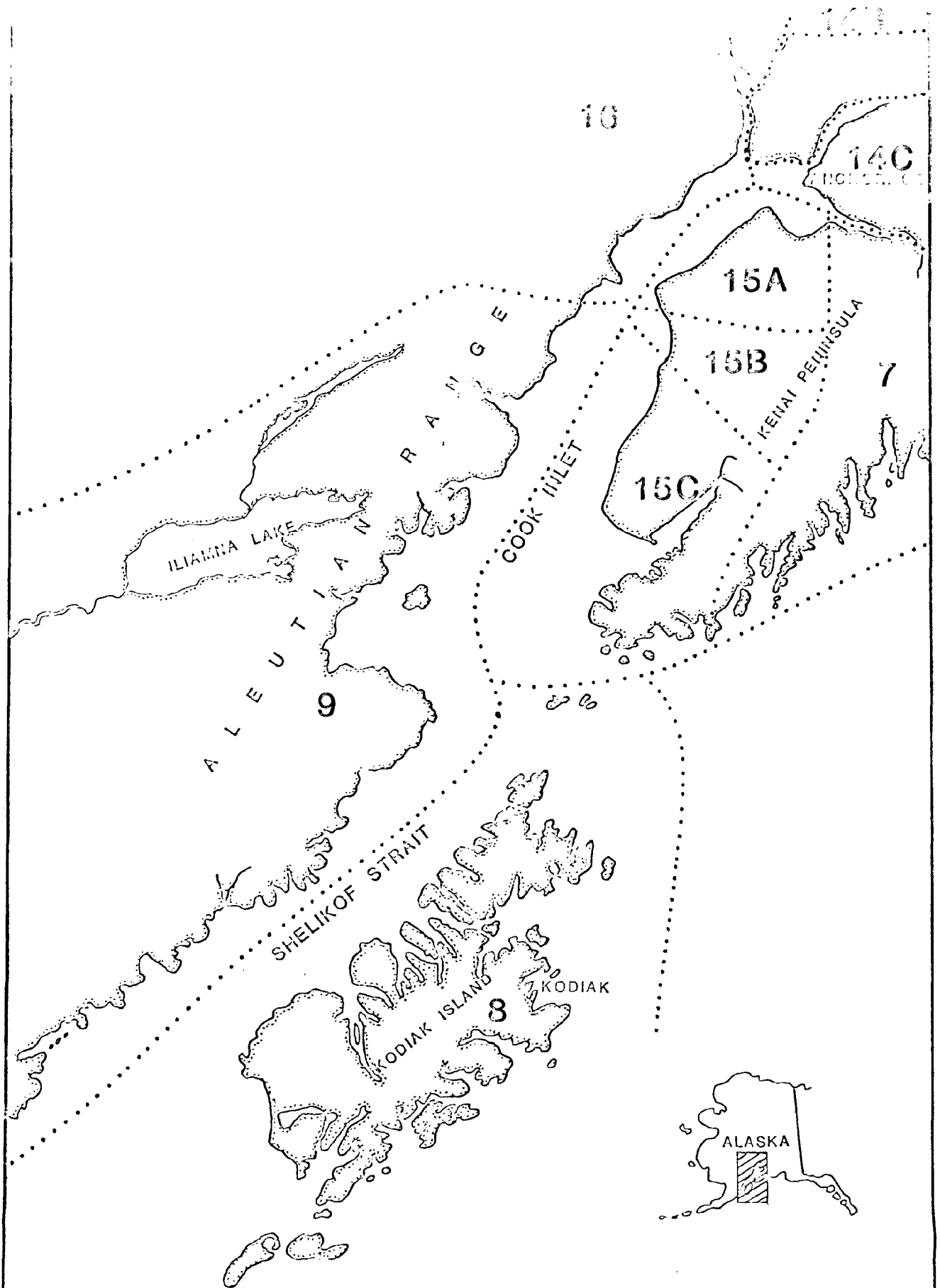
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LOCATION MAP - COOK INLET-KODIAK AREA



GAME MANAGEMENT UNITS AND SUBUNITS

VOLUME 1 - WILDLIFE

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INTRODUCTION

The Cook Inlet-Kodiak area contains some of the most diverse geography, weather patterns and wildlife to be found anywhere in Alaska.

The storm-swept Kodiak Archipelago (Game Management Unit 8) is known world wide as the home of the "Kodiak" brown bear. Roosevelt Elk have been introduced and occur only on Raspberry and Afognak Islands. Abundant marine mammal populations can be found along the extensive coastline. The habitat on these islands varies from rolling, windswept treeless tundra to solid stands of mature Sitka spruce. Some of the mountains reach up over 4,000 feet.

In contrast to the Kodiak Island group, which is an entity unto its own, the Cook Inlet area (Game Management Units 9, 14, 15, 16) is comprised of many physiographic features. Abundant wildlife populations occur throughout the area. The Kenai and Aleutian Mountain Ranges give way to flatlands that surround the waters of Cook Inlet. The coastal area is diverse. The northern shoreline is not particularly productive because of glacial siltation, but the southern shores are fertile habitat for sea birds and marine mammals. The western side of Cook Inlet and the Pacific side of the Aleutian Range consists of rugged mountains that end abruptly at the sea, leaving a rugged coastline.

The Kodiak-Cook Inlet area contains several large human population centers, and on the Kenai Peninsula, an extensive road system that intersects some prime winter moose range. Several hundred moose-vehicle collisions occur along this road system annually. The highway system does, however, allow access to the area for recreational use. Some major conflicts have occurred between cattle grazing and brown bears on Kodiak. Oil and gas exploration and petrochemical developments have taken place on the Kenai

Peninsula and in Cook Inlet, but most wildlife conflicts appear to be minimal. Proposed mining and logging activities in the Susitna Valley and along the western side of Cook Inlet pose potential wildlife problems.

The maps with the report identify seasonal distribution and movements, high density areas, critical habitat zones and areas of particular concern, map coverage includes the costal waters, beach fringes and uplands which have a direct or significant impact on the wildlife resources of the area.

The accompanying wildlife narrative section provides information relative to the big game, furbearers, small game, waterfowl, seabirds and marine mammals shown on the maps. Narrative accounts of life histories are restricted to information specific to area and species. Recreational and subsistence information by area and type of user, and distribution and abundance as related to habitat zones is presented for each species.

It is imperative that those who use this report recognize that wildlife populations are a viable, ever-changing resource. The information contained herein is as up to date as possible, but changing land tenure, human use and development and a multitude of natural factors require that our data be continuously gathered and updated.

Most of the wildlife information in this report was obtained from Alaska Department of Fish and Game biologists who reside in the area. Additional contributions were made by other staff members and from members of other wildlife resource agencies. These contributions are greatly acknowledged.

BLACK BEAR

The black bear (Ursus americanus), the smallest of the North American bear, is bulky in build and is quite variable in size depending on sex, age, and time of year. As adults, black bears stand about 26 inches at the shoulders and measure about 60 inches from nose to tail. An average adult male in summer weighs 180-200 pounds, with few exceeding 300 pounds. Female average weight is somewhat lighter than males. Fall specimens weigh 20 to 30 percent more than equivalent spring specimens. The usual color of the black bear is jet black with a distinctive brown muzzle and a small white chest patch.

In Alaska, black bears are distributed over about three-fourths of the state with no consistent records of the species north of the Brooks Range, on the Seward Peninsula, the Kuskokwim Delta, the Alaska Peninsula south of the Branch River, or on the islands in southeastern Alaska north of Frederick Sound. They are also absent from some of the large islands of the Gulf of Alaska, notably Kodiak, Montague, and Hinchinbrook.

The black bear is a forest species, and in Alaska its distribution coincides closely with distribution of forests. It has a decided preference for open forests rather than heavy timber and maximum populations generally occur in areas of broken habitat types. Semi-open forest areas composed primarily of fruit-bearing shrubs and herbs, lush grasses and succulent forbs are particularly favored. Expansive open areas are generally avoided by black bears.

Very little is known of the abundance of the black bear in Alaska. Areas of high relative abundance are known to occur, such as Prince of Wales Island in southeastern Alaska. Elsewhere in the state black bear

numbers are likely to be more sparse than in the southern climates where foraging seasons are longer and richer food complexes (fish) will favor greater densities.

Black bears have very poor eyesight but their senses of smell and hearing are well-developed.

Both sexes attain sexual maturity at approximately 3-1/2 years, though females may not breed until 5 or 6. Breeding takes place from about mid-June through mid-July (Rausch, 1961).

Gestation lasts approximately 7 months, however almost no active embryonic growth occurs during the first half of pregnancy. This is due to a delay in the implanting of the embryo (delayed implantation). Implantation of the embryo occurs in early December (Winsatt, 1964). Following first conception, breeding occurs during alternate years unless the cubs are lost or separated from the mother prior to or during the following breeding season (Erickson, 1964).

Young are born during late January or February while the mother is winter denned. At birth the cubs weigh only 8 to 10 ounces, the eyes are closed and they have little hair. The normal litter is 2, but a litter of 3 or 4 is not uncommon. Litter sizes observed in late summer and early fall suggest a low cub mortality. Upon emerging from the den in May the cubs weigh about 5 pounds and are covered with fine woolly hair. Cubs are very precocious. Black bear cubs as young as five months have survived with no maternal care.

Cubs are normally weaned by September when they are 8 months old. They apparently remain with their mother through the first hibernation period following their birth.

The life expectancy of black bears in the wild is unknown, but is probably much shorter than the 25 years attained by some captive bears.

The winter-denning period of the black bear is variable as to time and duration depending upon location and the animal's physical condition. Denning in Alaska will usually begin in October and extend through April and into May. Females with cubs usually emerge from dens later and den earlier than single bears. This is not considered true hibernation as they do occasionally emerge from their dens. Warm weather, particularly if flooding of the den results, is often associated with bears leaving dens for a short period. A few black bears have been seen moving about in deep snow.

The location selected for dens varies considerably. Most black bears favor dens dug beneath logs, or in holes dug into hillsides, although a few bears over-winter with little or no shelter at all. Some bears will spend considerable amounts of time constructing elaborate dens lined with leaves, ferns and other vegetable matter.

The diet of the black bear in Alaska is imprecisely known and is variable depending on the portion of the state in which they live. Bears are omnivorous and are opportunistic when it comes to food, and simple food availability is one of the most important factors governing food habits.

Upon emergence in the spring, grasses, sedges, and other early-appearing herbaceous plants appear to constitute the bulk of the diet. After mid-July and throughout the fall a variety of berries such as blueberry, low bush cranberry, high bush cranberry, elderberry, and Arctic blueberry become the most important food utilized by Alaska's interior black bears (Hatler, 1972). However, in areas where salmon occur, black bears food habits change to salmon as they become available.

Animal food, however, constitutes only a minor portion of the black bears total food intake. Hatler (1972) states that animal food, constitutes less than 15 percent of the annual diet, is apparently taken whenever it is obtainable, and is frequently carrion. Invertebrates (particularly insects) along coast areas are also sought by bears. The black bear will take an occasional prey animal, but is of little significance as a predator. Black bears, as with most bears, have been known to be cannibalistic.

Although quite wary of man, some black bears frequent garbage dumps in populated areas, often being encouraged as tourist attractions. Such bears frequently raid human dwellings, which results in a wasteful mortality of these nuisance animals.

Mortality factors affecting bear populations are for the most part unidentified. In accessible and inhabited areas, hunting and other human activities are the most significant. Relatively unexploited populations appear naturally limited by other, unidentified factors.

Parasites infestations of black bear are generally low. Endoparasites, such as roundworms, tapeworms, lungworm, hookworms and filariid worms are common. Trichinae give the most cause for public concern, as most bears are infected by this parasite. All bear meat should be well-cooked before eating.

BLACK BEAR - UNIT 9 (ALASKA PENINSULA)

Black bears are considered a minor species in this region as they occur in low numbers and are confined generally to the northern portion of the unit. Although population numbers are low, the species range is felt to be expanding. Previously, the southern range limit was described as the sparse spruce forest habitat below Lake Iliamna or the Iniskin-Chinitna Bay area, however; sightings have been reported in Katmai National Monument and on the Douglas River (Jim Faro, A.D.F.&G., pers. comm.).

Black bears are seldom hunted in this unit although a few are taken on guided hunts. Most are taken incidental to hunting of other big game or even to fishing. Apparently, local residents take a few bears for food when they are readily available. This use was probably more important in the past than it is today.

Harvest for 1975 was estimated to be less than 20 animals with the effort evenly split between sport and local domestic uses.

The population levels are too low to justify any potential non-consumptive uses.

Generally speaking, most factors impacting the brown bears will likewise impact the black bears.

BLACK BEAR -- UNIT 14 (ANCHORAGE)

Black bears are present throughout Unit 14 in varying abundance. Although population figures are not available densities are considered fairly high in the central portion of Subunit 14A. (J. Didrickson, Area Biologist, A.D.F.&G., Palmer, pers. comm.). In the southern portion, Subunit 14C (including the Anchorage vicinity), densities are moderate (D. Harkness, Area Biologist, A.D.F.&G., Anchorage, pers. comm.). It is doubtful that black bear populations in this unit were ever much higher than they are at present, except in what is now metropolitan Anchorage. Even here, the suburban areas support good numbers of bears, as attested by numerous public complaints in the spring.

Little explicit information is available regarding distribution and habitat requirements of black bears within this region, however, the population is considered to be typical of the species.

The bears appear usually in early May and are presumed to migrate to available food areas in lowlands, to southern exposed slopes and to local dumps. later in the season, concentrations may be seen for periods on salmon streams, moose calving grounds or berry patches, but usually they are dispersed throughout the drainages below 2,000 feet. Some areas of noted concentrations occur along the Susitna and Little Susitna Rivers in spring; in Hunter Creek drainage (south of Knik River Flats) in August, and in the lower Eagle River-Fort Richardson area beginning in July (J. Didrickson and D. Harkness, pers. comm.).

Denning occurs by early October and appears to be dispersed throughout the region.

Harvest from this unit is most accurately termed an "incidental sport" harvest. This implies that most of the harvest occurs opportunistically while hunting another species or by chance encounter. In many cases the carcass is salvaged for meat.

Historical records of harvest were essentially non-existent until the hide sealing regulation became effective in July, 1973. Even in the short period since that date, the recorded harvest has shown dramatic fluctuations. This is related to the subjective "presence" of black bear. Due to some unknown distribution factor, in some years, bears are common and other years, very few are visible. In 1974, harvest was low, totaling 28 for the entire unit. In 1975, the harvest rebounded, taking 97 bears throughout the unit. This difference appears to be a shift in distribution and not a population fluctuation over a one-year period.

The harvest is taken almost entirely by resident hunters. This current level of pressure does not appear to have affected bear numbers to any significant degree. Hunting in the area east of Anchorage has probably been a beneficial damper on annual fluctuations of bear numbers. Extremely high bear populations could create problems in Anchorage during the spring.

BLACK BEAR HARVEST - UNIT 14 (ANCHORAGE)

Year	Subunit	Total Harvest	Male	Female	Unknown	Mean Skull Size Male	Mean Skull Size Female
1973 ^{1/}	14A	42	24	17	1	17.6(21)	15.6(15)
	14B	22	19	2	1	16.8(16)	13.6(1)
	14A or B	3	0	3	0	--	15.3(2)
	14C	6	5	1	0	17.6	--
1974	14A	17	29	8	0	17.3(7)	15.9(5)
	14B	7	19	2	3	17.8(2)	14.9(2)
	14C	4	3	0	1	16.6	--
1							
1975	14A	65	33	23	9	16.1(27)	15.6(22)
	14B	15	8	5	2	15.6(7)	15.2(4)
	14C	17	14	1	2	16.7	--

1) 1973 data from period July 1 to December 31.

All data extracted from hide and skull sealing forms.

BLACK BEAR - UNIT 15 (KENAI)

Black bear occur in moderately high abundance throughout the western half of the Kenai Peninsula. With the total population estimated between 1,000 to 3,000 bears (P. LeRoux, Area Biologist, A.D.F.&G., Soldotna, pers. comm.). Their distribution is generally widespread through this region with the exception of a locally reduced population in the vicinity of Homer (i.e. - result of local hunting efforts).

This unit is considered to be prime habitat for black bear. The topography of the region provides an ideal broad lowland area from the shores of Cook Inlet to the base of the Kenai Mountains. This area not only possesses high density moose calving areas but also provides profuse spring vegetation. Spring foraging habits are similar to other areas with preferred foods being grasses, sedges, horsetails, carrion and when available, moose calves. High density concentrations of black bears are known to occur on the moose calving grounds in the northern portion of the unit. Concentrations also have been observed in the early spring on the bluff west of Chickaloon Flats (C. Irvine, Game Biologist, A.D.F. &G., Anchorage, pers. comm.) and tracks noted on the Flats in the intertidal zone (L. Miller, Game Technician, A.D.F.&G., Anchorage, pers. comm.).

Due to the abundance of forage in this area, differences may exist between the seasonal movements of this population in comparison to those of a more mountainous region. Indeed, it is suggested that some bears probably never leave the lowlands.

Spring habitat is probably not critically limited throughout most of this area.

Red, pink and silver salmon appear in the major streams in late July and August and are sought by black bears. By mid-August, high-bush and lowbush cranberries, blueberries, elderberries, bearberries and crowberries make up a large part of the diet of those bears using the alpine-subalpine habitat. Food habits of bears in the lowlands late summer-fall period are not clearly defined. The late silver salmon run in Swanson River is felt to be an important food source (P. LeRoux, pers. comm.).

Denning sites appear to be widely distributed throughout Unit 15. Timing is variable but denning generally occurs in late-September.

Historical data on black bear harvest is very sparse. In 1969, a voluntary multiple species questionnaire first gathered a partial representation of the harvest. Later, in July of 1973, a mandatory program of sealing black bear hides and skulls was initiated. Trend predictions from this current data base must be judiciously speculative in application.

Sport harvest from this unit is currently moderate, averaging 71 bears in 1974 and 1975. This average is considerably below the 1973 harvest when 71 bears were sealed in the fall alone; the estimate for the entire year was approximately 90 bears. The difference is partially due to the incidental nature of the hunt; as moose harvest effort declined or shifted, so, too, did black bear harvest. Additionally, the relative abundance of black bear appeared reduced in this unit in 1974 (S. Linderman, Area Biologist, A.D.P.&G., unpublished data). It is generally believed that black bear populations fluctuate independently of hunting pressure in most areas.

Peak harvest generally occurs in May and September with the overall harvest predominantly in the fall. The present harvest is

probably below the level of harvest the unit can sustain. Since black bears are a relatively low density species and are not readily visible in their forest habitat, they are not easily overharvested.

It is suggested that the harvest is predominantly recreational with less than 50% of the hunters utilizing the meat. Non-residents take an average 10% of the harvest (P. LeRoux, pers. comm.).

Black Bear Harvest - Unit 15 (Kenai)

Season	Total Harvest	No.Males	%Males	No. Non-resident	% Non-resident
Fall '73	69	38	55	8	11
Spring '74	14	9	64		
Fall '74	53	33	62		
Total	67	42	63	15	22
Spring '75	30	19	63		
Fall '75	46	26	56		
Total	76	45	59	6	7

Data extracted from A.D.F.&G. hide sealing forms.

BLACK BEAR - UNIT 16 (LOWER SUSITNA)

Black bear information from this unit is currently very sketchy. Although generally acknowledged as a common species, black bears are only occasionally visible throughout most of their habitat due to the terrain and vegetative cover. Estimates of total population are unknown, however; in some lowland and in certain years, alpine areas, reasonably high seasonal densities are annually observed, indicating the population is "healthy".

Little explicit information is available regarding ranging, distribution and habitat requirements within this region. Generally, the bears become visible beginning in early May in the lowlands and on the river flats. An area of high spring density has been noted in the flatlands around the mouth of the Susitna River and in the region between the Yenta and Susitna Rivers. (J. Didrickson, Area Biologist, A.D.F.&G., Palmer, pers. comm.) Typical spring food consists of grasses, sedges (Carex), horsetails (Equisetum), carrion and possibly, moose calves for a short period in late May and June.

Fish provide a significant portion of the black bear's diet in early spring. Sockeye salmon begin first appearing in the streams in late May followed by silver salmon in July. Several streams, such as the Little Susitna River, receive intensive use during these spawning runs. In early August, some attention is turned to blueberries, elderberries, lowbush and highbush cranberries, bearberries and crowberries.

During some years, bears appear above timberline in the alpine habitat in the fall. The reasons for this occasional appearance are unknown.

Denning appears to be variable in timing, but usually occurs in late September. Trend data is lacking to establish the preferred denning habitat.

By late spring, the lowland vegetation has become profuse enough to effectively conceal the bear's movements from the air.

Aerial surveys of alpine habitat in October, 1974 found fewer bears in the northern portion of the unit (Peters Hills, Dutch Hills) than in the southern portion (Yenlo Hills, Beluga Mountains and Mt. Susitna). An additional survey, four days later, found a lesser number in the southern portion and no bears in the northern portion. This may suggest a differential denning movement keyed to some unknown factor(s) (e.g. - accumulating snowfall, diminishing food resources) (R. Modafferri, Game Biologist, A.D.F.&G., Anchorage, pers. comm.).

Proposed radio tracking studies in this area should provide essential details regarding typical daily and seasonal movements of black bears. It is essential to obtain this range and distribution data in order to define critical habitats and events in the life history of the black bear.

In past years, the black bear generally has been regarded as an incidental big game species. Harvest pressure has been light and management attention minimal. On July 1, 1973, a hide and sealing program was initiated to begin providing background data for future management programs. Prior to this time, no comprehensive harvest data had been recorded.

Harvest of this species appears from year to year to be quite variable. This is due to a number of factors. The peak recorded harvest of 140 bears from subunit 16B in 1973 coincides with the chronology of the peak moose harvest in that subunit. This indicates

that a significant portion of the harvest is opportunistic and incidental to the hunting of other species.

In 1976, the bear hide sealing form will be amended to gather information regarding incidental versus primary objectives of the bear harvest effort.

The level of harvest also seems to vary with the subjective "presence" of bear. The same years that bears are not locally visible, harvest is decreased. Without credible distribution data, the implications are not clear. However, it primarily suggests the bears are preferentially utilizing various habitats rather than relying upon a site specific one. This suggestion agrees with the impression of the black bear's "adaptable" nature.

Another factor affecting level of harvest has been the "fair chase" regulation, effective July 1, 1974, adding black bear to the list of big game species which may not be hunted the same day an individual is airborne. Removing the opportunity for black bear hunters to spot bears from the air and shoot them on the same day could be very effective in reducing the harvest on this wary species in a unit where air transportation is important. The impact of this regulation is not yet clearly discernable.

Black bear hunting is popular in the spring when they are the only species of big game that can be legally taken. Hunters seek bears shortly after the bears emerge from hibernation when their hair is longest and the hide is of excellent quality. Hide quality deteriorates as the winter hair is shed and rubbed spots appear, and most sport hunting ceases by mid-June as a consequence. The harvest of males is greatest in the spring because they leave the den before females and because females accompanied by cubs are protected by regulation.

Sport hunting of bears resumes in September when hides have improved in quality and continues until bears den for the winter. Black bears suport considerable use at this time but many of the bears harvested are taken incidental to hunts for other species. The proportion of females in the fall harvest is greater in comparison to the spring harvest due to a greater availability of sows that have become naturally separated from grown cubs.

Permits were requested by a small number of people in 1975 to allow the use of hounds for black bear hunting. This may be the beginning for Alaska of a popular and traditional sport practiced throughout other states.

In terms of "subsistence" effort, the motives of black bear hunters are not precisely defined. Historically, the regulations have not required sealing of the hide in order to accommodate both the meat and trophy hunters. The regulations did not require the trophy hunter to pack out the carcass for meat nor the meat hunter to pack out the hide and skull for sealing. The 1976 hide sealing program will be amended to finally delineate the difference between these respective efforts.

Under comparative intensive management throughout the contiguous states, harvest figures typically indicate the average animals taken are from the yearling to two-year-old age classes. Preliminary studies of the Alaskan harvest indicates the average is from an older age class. These differences imply that the Alaskan black bear population likely has a large harvest potential (R. Modafferri, Game Biologist, .A.D.F.&G., Anchorage, in progress.)

Because of a paucity of available data, it is currently difficult to assess the sensitivity of black bear to environmental impacts. Logically, the destruction of preferred habitats will reduce the

density of bears, however; the nature of the impact may vary the bear's response. For example, proposed dam construction on the Susitna River simply will remove available habitat but continued human encroachment will likely amplify the bear's notoriety as garbage scavengers (and human nuisance). The total effects of proposed clearcutting and open pit mining in this unit are not well understood.

Black Bear Harvest - Unit 16(Lower Susitna)

Year	Subunit	Total Harvest	No. Males ^{2/}	% Males	Mean Skull Size Male ^{3/}
1973 ^{1/}	16A	15	8	62	15.2(8)
	16B	140	88	68	16.7(72)
	16A or B	1	0	0	(0)
1974	16A	15	9	64	15.7(9)
	16B	49	34	72	17.1(31)
	16A or B	2	1	50	17.6(1)
1975	16A	18	12	75	15.8(10)
	16B	100	63	73	16.8(53)
	16A or B	1	1	100	17.2(1)

1) 1973 data for period July 1 - December 31.

2) Percentage based on known sex of bears.

3) Skull sample size in parenthesis.

SELECTED REFERENCES

- Alaska Department of Fish and Game. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 143 pp + 563 maps.
- _____. 1975. A fish and wildlife resource inventory of the Northeast Gulf of Alaska. Vol. I and II (411 pp, 757 pp. + 128 maps).
- Burt, W.H. and R.P. Grossenheider. 1952. A field guide to the mammals. Houghton Mifflin Co., Boston. 284 pp.
- Didrickson, J.C. and D. Cornelius. 1975. Black bear survey-inventory annual report. Game Management Units 14 & 16. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- Dufresne, F. 1946. Alaska's animals and fishes. A.S. Barnes and Co., N.Y. 279 pp.
- Erickson, A.W. and W.C. Youatt. 1961. Seasonal variations in the hematology and physiology of black bears. J. Mamm. 42(2):198-203.
- _____. 1965. The black bear in Alaska. Alaska Dept. of Fish and Game. Fed. Aid Proj. No. W-6-R-5.
- Hall, R.E. and K.R. Kelson. 1959. The mammals of North America. Roland Press. New York. Vol. I and II. 1,083 pp.
- Hatler, D.F. 1972. Food habits of black bears in interior Alaska. Can. Field Nat. (86(1):17-31.
- Johnson, L. 1971. The black bear in Alaska. Alaska Dept. of Fish and Game. Wild. Notebook Series. 2 pp.
- LeRoux, P.A. 1971. Black bear survey-inventory annual report. Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____. 1973. Black bear survey-inventory annual report. Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- _____. 1974. Black Bear survey-inventory annual report. Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-5.
- _____. 1975. Black bear survey-inventory annual report. Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- Manville, R.H. and S.P. Young. 1965. Distribution of Alaskan mammals. U.S. Fish and Wildlife Ser. Cir. 211. 74 pp.
- Walker, E.P. et al. 1964. Mammals of the world. John's Hopkins Press. Baltimore. Vol. I and II. 1,500 pp.

BROWN-GRIZZLY BEAR

The brown-grizzly bears (Ursus arctos) are the largest animals of the genus, with the Alaskan brown-grizzly bears the largest of all carnivores. Most taxonomists now believe that the brown bear and grizzly bear are all of a single species. Brown bears on the Kodiak-Afognak Island group are a reproductively isolated population with distinctive cranial features, and are considered a separate subspecies. However, reference to the brown bear implies southern coastal populations; whereas, reference to the grizzly bear indicates northern and interior Alaska populations.

The brown bear resembles its close relative the black bear, Ursus americanus. The brown bear, however, is usually large, has a more prominent shoulder hump and longer, straighter claws. Other characteristics such as the shape and relative massiveness of the head help to differentiate these species. Color is not a reliable key in differentiating these bears for both species have many color phases.

Mature males weigh between 500 to 900 pounds with extremely large individuals weighing as much as 1,400 pounds. Females weigh one-half to three-quarters as much as equivalent aged males in given locales. An extremely large brown bear may have a skull approaching 18 inches in length. Such a bear when standing on its hind feet is about nine feet tall. Inland, bears are usually smaller than coastal bears; perhaps because they lack the rich supply of fish.

The Alaska brown-grizzly bear is common over most of the state. They inhabit the Alaskan Peninsula, Kodiak and Afognak Islands, Montague and Hinchinbrook Islands in Prince William Sound and Baranof, Chichagof and Admiralty Islands in southeastern Alaska.

Although there are no precise data on the abundance of brown-grizzly bears in the state, there is a general understanding of the species' status. Numerous attempts to determine the abundance of brown-grizzly bears in various portions of the state have met with little success except to yield minimum estimates and to provide information on their relative abundance.

Brown bears are probably as abundant in the state as during earlier times, except where they have been displaced by man. Definite reductions in bear numbers have occurred near human population centers. A marked reduction has occurred on the Chiniak portion of Kodiak Island, where conflicts between livestock interests and brown bears are common.

Tagging studies have shown that bear movements are confined to limited areas and movements in excess of 30 miles are unusual. Burns and Hensel, (1972) state that in the Kodiak National Wildlife Refuge the size of individual activity areas, established by eight bears, averaged 5.5 square miles and four bears used two activity area each that averaged 5.7 square miles in size. Activities were associated with food gathering and winter denning. Fixed frequency and location indicated that the 14 bears studied spent 50 percent of their time in lowland habitat.

The breeding biology of brown-grizzly bears is reasonably well known. Both sexes usually attain sexual maturity at 3 1/2 to 4 1/2 years. Females mature as early as 2 1/2 years while others are 6 1/2 years old at first breeding. Males are usually sexually mature by 4 1/2 years of age.

Matings take place from May through July with the peak of activity in early June. Brown bears generally do not have strong mating ties, but individual bears have been observed remaining with their mates for over a month. The hairless young, weighing less than a pound, are born the following January or February in a winter den. Litter size ranges

from one to four cubs; two are most common.

The large size attained in several months' growth by coastal brown bear cubs compared to interior cubs suggests the differences are largely caused by environment rather than by genetics. A richer food supply, particularly protein-rich salmon, is generally available to coastal bears. The foraging period of coastal bear cubs is also several months longer than that of interior bear cubs which spend more time denning.

The gestation period, usually about 245 days, includes a relatively long period of delayed implantation, when the blastocyst lies nearly dormant. Implantation usually occurs in October or November.

The cubs remain with their mothers through their second year of life. Female brown bears give birth to a new litter every two or three years. There is strong evidence that the usual interval between litters is three years.

Maximum life span in the wild is unknown, though captives have lived to be 30 years old. Age determinations of wild bears using tooth cementum aging techniques suggest that some bears reach their late 20's.

Cub and yearling litters observed in summer average slightly in excess of two, suggesting a high survival rate for cubs from conception to family breakup. However, it is possible that natural mortality affecting litters may most often involve the entire litter rather than individual cubs, thereby masking the true extent of mortality.

During winter, bears experience a period of dormancy which they spend in dens. During this time their body temperature drops, and their general metabolic rate is reduced. This is not considered complete hibernation since they do occasionally emerge from their dens to forage, particularly during spells of warm weather and during years when food is scarce prior to denning.

Bears usually enter dormancy in November and December and emerge during April or May. The den is often a natural shelter between tree roots or rocks or may be an excavation dug by the bear itself. Dens are most common at high elevations near timber-line, but may be found anywhere from sea level to alpine areas. On the Alaska Peninsula and Kodiak, dens are usually located in the alder, willow and grass zone, and are often lined with grass and leaves.

The precise habitat requirements of brown-grizzly bears are unknown, but they are seemingly most at home in open tundra and grassland areas. Even where they occur in forested areas, as in southeastern Alaska, substantial mountain meadows, muskegs, sedge flats, and other grassland areas are present. Perhaps the best indication of habitat requirements is the fact that the most dense populations occur in lush grassland communities, as on Kodiak Island and Alaska Peninsula. Grassland types appear especially critical for bears during the spring, when other high quality foods are scarce.

The brown-grizzly bear is an opportunist and will feed on game or domestic animals when it is available. The brown bear is probably not a significant predator on big game species except possibly during spring when the young are most vulnerable. Bears are fond of carrion and will feed on carcasses of any animals they come across. Some instances of cannibalism have been recorded. As a rule, animal matter constitutes a lesser but important portion of the grizzly bear's diet. An exception is coastal areas where abundant salmon comprise a major segment of the summer and early fall diet.

Bears often congregate where food is abundant, and may be seen fishing side by side in salmon streams. On July 28, 1970, thirty-one brown bears were seen fishing at McNeil River falls at one time.

Human activities are the most significant mortality source. Sport hunting is presently the most important human-related mortality factor, but there is also a high mortality of nuisance bears near inhabited areas. Often situations attractive to bears, such as garbage dumps and free-ranging livestock, are responsible for conflicts ending in the bear's death. Factors limiting remote and unexploited populations are largely unknown. Of all Alaska's wildlife, brown-grizzly bears are probably least compatible with human activities. Without special consideration, their numbers will be markedly reduced where substantial and sustained human occupation and confrontation occur. Even with protection, a certain amount of conflict and consequent attribution of bears can be expected. The whole history of the species on this continent has followed this pattern, and today grizzly bears have disappeared from most of their former range in the contiguous United States and Central America. Their numbers have been markedly reduced over much of Canada and in small portions of Alaska. The brown bear in Europe has suffered a similar fate.

The eventual survival of the brown-grizzly bear may not depend entirely on the designation of vast tracts of unspoiled "wilderness", as shown by conflicts occurring in large national parks. Instead, the future of the bear lies in the reassessment of human values to include reasonable co-existence with it. Bears are not constant competitors and the major conflicts usually have resulted from improper land planning and classification, marginal economic pursuits, and basic misunderstanding of bears and their behavior.

BROWN BEAR - UNIT 8 (KODIAK-AFOGNAK)

Credible estimates of the total Kodiak brown bear population are difficult to establish. There is general agreement among authorities that the magnitude of the current population is from 1,800 to 2,500 animals. It appears that this population has declined slightly in recent years.

Brown bears have usually begun to leave their dens by mid-April. The bulk of the population is out by mid to late May. The scarcity of available food in the early spring makes this probably the most stressful period on the bear population. Depending on the depth and persistence of the remaining snow cover, the animals concentrate their foraging for available food on the southern exposure slopes, the coastal fringe and even out onto the intertidal. Feeding primarily on newly-emerging plant species such as cow parsnip, red poque, sedges, horsetails, lupine, false hellebore and grasses; they also will be scavenging carrion from winter kills of elk, deer and marine mammals and may frequent the local dumps. A particularly harsh winter with heavy spring accumulations of snow make the narrow beach fringes critically important habitats.

Bear densities will increase at the mouths of streams and heads of bays as vegetations become lusher and the first runs of salmon begin (typically late May and early June for sockeye). The lower reaches of the major salmon streams receive intensive use throughout the spawning seasons (consult fisheries data for timing details).

Early summer finds many bears near the edge of the alpine-subalpine zone. Considerable movement occurs between this zone and the valley floors where fish runs appear. It is suspected that these movements,

in some cases, are keyed to the availability of particular food resources. Bear food habits during this period are not well-known but the alpine-subalpine area is probably extremely important. Recent studies by G. Atwell (USFWS, Kodiak, 1975) on bears in the alpine habitat will soon be available and should indicate more explicitly the extent of foraging and associated activities in this zone.

Although there are still daily movements between zones, some bears begin to feed on ripening berries by early August. The most important berry foods are lowbush cranberries, high-bush cranberries, elderberries, blueberries and salmonberries. Radio-tracking studies by the USFWS indicate that activity areas (the units of habitat used to fulfill normal living requirements average 5.5 square miles and range from 1.0 to 13.9 square miles per bear. Overland movements seem largely responsive to salmon runs in the surrounding drainages.

Denning begins in early November although a few bears may stay out until mid-December. On many streams, silver salmon are reaching their peak of spawning in early November. This species may be more important to late denning bears than previously believed.

Seventy-four bear dens discovered to date by Richard Hensel of the USFWS were found from 100 to 3,300 feet above sea level, with most occurring at elevations of around 1,800 feet. Most bears denned along the lower limits of subalpine habitat (at 1,500 to 2,000 feet), probably because of the cover provided by alder or willow thickets. In addition to providing concealment, shrubs tend to bind the soil, thus limiting the probability of den collapse during spring thaws. Further, the drifting snow that accumulates within thickets may be important as an insulating layer over dens.

North-facing slopes are most often chosen as denning sites, perhaps as a result of the northwesterly orientation of major valley systems. Bears evidently prefer to den on well-drained sites where water seepage into dens is minimized and excavated material is more easily deposited downhill. New dens are excavated each year because thawing, seepage, and erosion destroy dens soon after abandonment. According to Hensel, the most important features of denning habitat are: (1) steep to gentle sloping ground; (2) semi-open areas associated with willow or alder shrubs and (3) a relatively stable soil substrate.

Over 2,000 bears have been taken as sport harvest from this unit from 1961 to 1975 (annual average - 134). Non-resident success accounts for an average 55% and has been recently increasing (69% in 1975). In 1976, the management system will shift to complete control by ADF&G rather than the historic system of jurisdictional state and federal management. A tighter limited permit system is also being initiated partially to compensate for increased hunting pressures on what currently appears to be near maximum sustained harvest.

Subsistence effort is considered non-existent. Bear-cattle conflicts still occur; however, the future of ranching based on present enterprise, appears marginal.

The Karluk Lake drainage is noted as a public viewing and photographic location. USFWS has conducted scientific studies in the lake region and the surrounding alpine habitat.

Several immediate potential threats exist which are anticipated to impact the bear population. Primarily, the Native Land Claims selections will place approximately two-thirds of the island group

lands under private ownership, including nearly the entire coastal regions. Any development of these areas will reduce available critical spring habitat and likely increase incidental kill from bear-human interaction. Secondly, increased hunter success is anticipated from improved accessibility to remote areas via present and future logging developments.

Finally, the dependence of bears on fish, although not completely understood, is probably critical.

BROWN BEAR HARVEST - UNIT 8 (KODIAK-AFOGNAK)

Brown-Grizzly bear sport harvest, calendar years 1961 through 1975.

Calendar Year	Total Kill	No. Males	% Males ^{1/}	No. Non-res.	% Non-res.	Mean Hide _{2/} Size Male	Mean Skull _{3/} Size Male	Mean Age Male _{4/}	Calendar Year Seasons
1961	117	77	66	73	62	17.0	25.2		1/1-5/31
1962	131	90	69	84	64	16.4	24.8		Same
1963	109	76	70	55	50	16.3	24.6		Same
1964	121	73	62	62	51	15.1	23.6		Same
1965	184	110	60	87	47	15.7	24.9		Same
1966	200	107	55	97	49	15.6	23.9		Same
1967	186	107	58	92	49	15.5	23.7	5.0(14) Fall	1/5-5/20 10/1-12/31
1968	105	61	59	62	59	15.5	23.8	6.2(52)	Same
1969	97	61	63	52	54	15.9	23.8	6.2(53)	1/1-5/20 10/20-12/31
1970	92	61	68	44	48	15.1	23.0	6.0(57)	3/1-5/10 10/20-12/31

continued

- 1) All male % based on known-sex bears.
- 2) Length plus width given in feet.
- 3) Length plus width given in inches.
- 4) Tooth sample size in parenthesis.

(continued) Brown-grizzly bear sport harvest, calendar years 1961 through 1975.

Calendar Year	Total Kill	No. Males	% Males ^{1/}	No. Non-Res.	% Non-res.	Mean Hide ^{2/} Size Male	Mean Skull Size Male ^{3/}	Mean Age ^{4/} Male	Calendar Year Season
1971	113	63	60	51	45	15.1	3.3	6.4(59)	3/1-5/10 10/20-12/31
1972	132	80	62	71	54	15.1	3.5	6.2(77)	3/1-5/15 10/20-12/31
1973	155	85	55	91	59	15.5	24.1	7.4(84)	3/1-5/15 10/20-12/31
1974	165	95	58	113	68	15.4	24.1	7.0(92)	3/1-5/15 10/25-12/31
1975	118	70	59	82	69	15.3	23.6	6.5(66)	3/1-5/15 10/25-12/31

BROWN BEAR - UNIT 9 (ALASKA PENINSULA)

Brown bears occur throughout southwestern Alaska except on the islands west of Unimak in the Aleutian Chain. This area supports the largest populations of brown bears found in the state, and although precise data on abundance is lacking, there is general understanding of the species' status. Brown bears are probably as abundant in this area now as they have ever been. Coastal regions support larger populations than interior regions, possibly due to the abundant supply of fish and other foods that are available to bears over a longer period of the year. (L. Glenn, A.D.F.&G., Game Biologist, Anchorage, unpublished material.)

Brown bears tend to defy easy definition into "coastal" or "interior" populations of the Alaska Peninsula due to their extensive ranging. Indeed, with the salmon runs arriving earlier on the Pacific coast, bears are known to cross the ridges into the Pacific drainages in apparent ranging for food (J. Faro, Area Biologist, A.D.F.&G., King Salmon, pers. comm.). These populations utilizing the coastal drainages, currently appear to be stable in contrast to the central portion of the unit which has begun to show signs of intensive hunting pressure.

In early spring, high densities of bear occur in the grassy flatlands at the headwaters of bays all along the coast. This occurs particularly prior to the availability of salmon runs. The flatlands throughout Kamishak Bay are described as critical intensive use spring habitat with unconfirmed reports indicating similar levels at Insiskin Bay.

Several coastal highland regions have been designated as confirmed denning areas. Notably, the Kamishak and Douglas River drainage highlands have been proposed as critical high density denning areas.

Coastal harvest from the Cook Inlet drainages typically accounts for 10% of the unit's total harvest (140 total in 1974). This small sport effort is due to the area possessing virtually no permanent settlements and only fair accessibility from aircraft or boat (in comparison with the remainder of the unit).

Throughout the unit, the spring harvest tends to select for the taking of males (i.e. - at this time the sows still with cubs or yearlings and are illegal to harvest). Over the past years, this management action has shifted the populations sex ratio in favor of females. This in turn has been the primary factor in a noted increased cub productivity.

The concentration of bears at the McNeil River State Sanctuary and in Katmai National Monument provide the best non-consumptive viewing areas in the region. During July and August, approximately 70 bears can be observed fishing in the McNeil River.

BROWN BEAR HARVEST - UNIT 9 (ALASKA PENINSULA)

1974

Area	Number	Percent
Cook Inlet	14	10.0
Lake Clark-Lake Iliamna	6	4.3
Branch River-Naknek River	5	3.5
King Salmon River-Mother Goose	32	23.0
Cinder River-Port Moller	21	15.0
South Tip	26	18.5
Pacific Side	36	25.7
Unspecified	0	0.0
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Total	140	100.0
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Data extracted from bear hide sealing program.

BROWN BEAR HARVEST - UNIT 9 (ALASKA PENINSULA)

Brown-Grizzly Bear Sport Harvest, Calendar Years 1961 through 1975.

Calendar Year	Total Kill	No. Males	% 1/ Males	No. Non-res.	% Non-res.	Mean Hide 2/ Size Male	Mean Skull 3/ Size Male	Mean Age 4/ Male	Calendar Year Seasons
1961	120	85	73	71	59	16.3	25.5		1/1-5/31, all of 9 10/1-12/31, s. of Egegik Puale Bay. Rem of Unit 9/10- 12/31.
1962	154	108	70	96	62	16.3	26.6		Same.
1963	164	100	65	114	70	15.9	26.6		1/1-5/31, 9/1-12/31.
1964	155	103	70	108	70	16.1	26.6		Same.
1965	210	136	66	139	66	15.6	25.7		1/1-5/31, all 9. n. of Meshik 9/1- 12/31. s. of Meshik 9/15-12/31.

continued

- 1) All male % based on known sex bears.
- 2) Length plus width given in feet.
- 3) Length plus width given in inches.
- 4) Tooth sample size in parenthesis.

Continued.

Calendar Year	Total Kill	No. Males	% 1/ Males	No. Non-res.	% Non-res.	Mean Hide 2/ Size Male	Mean Skull 3/ Size Male	Mean Age 4/ Male	Calendar Year Seasons
1966	231	157	71	173	75	15.6	25.8		N. of Meshik 1/1- 5/31, 9/1-12-31, s. of Meshik 1/1- 5/31, 9/15-12/31.
1967	214	147	70	163	76	15.7	24.5		1/1-5/20, 9/15-12/31
1968	160	113	73	134	84	15.4	24.0		1/1-5/10, 9/15-12/31
1969	93	66	75	67	72	15.7	24.3	7.5(55)	1/1-5/10, all of 9 9/15-10/30 n. of Park. 10/1-11/30 s. of Park.
1970	158	103	67	119	75	15.1	23.9	6.9(93)	S. of park 5/1- 5/15, n. of park 5/1-5/25, all of 9 10/1-10/31.
1971	195	122	66	138	71	15.0	23.9	6.8(112)	5/10-5/25, 10/1-10/31.
35 1972	279	154	56	203	73	14.6	23.3	6.8(146)	5/10-5/25, 10/1-10/31.
1973	241	138	59	182	76	14.8	23.2	6.0(129)	5/10-5/25, 10/7-10/2
1974	140	74	53	114	81	14.1	21.4	5.5(73)	10/7-10/21
1975	224	121	54	139	62	14.4	23.0	6.0(119)	

BROWN BEAR - UNIT 14 (ANCHORAGE)

Very little information is available on brown bear in Unit 14. The population is small, perhaps totaling less than 100 animals (J. Didrickson, Area Biologist, A.D.F.&G., Palmer, pers. comm.). As the result of human development in Subunit 14C (Anchorage and vicinity), its population is likely less than 10 (D. Harkness, Area Biologist, A.D.F.&G., Anchorage, pers. comm.)

Typical for this species, they begin hibernating in early winter usually above or at timberline. In the spring, depending on conditions, they emerge to feed on early grasses on south facing slopes and river valleys. In summer and fall, they are found nearly everywhere food is available (i.e. - moose calving areas, salmon streams, dumps, etc).

The Knik River flats is a noted prime habitat in this unit. Likewise, the dump at Eklutna Power Plant at times attracts five or six bears during the summer-fall periods. Otherwise, the bears are rarely visible in this unit.

Harvest from this unit is entirely sport motivated. Historically, the harvest has been very low (usually less than 15) implying that most bear are taken incidental to other hunting. Comparing the harvest for any one year with the opening date of the brown bear season suggests that the harvest can be significantly influenced by opening the season on an earlier date to increase the number of days on which moose, sheep and brown bear seasons overlap. In recent years the harvest has dropped even lower, to typically less than five. The closure of Chugach State Park to brown bear hunting is undoubtedly significant in sustaining this reduced harvest level. (J. Didrickson, pers. comm.).

It is apparent from age, hide size and skull size data that most of the brown bear taken in Unit 14 are young bears. It is probable that these young, less wary bears are attempting to establish territories in this area of relatively high human population. There are undoubtedly reservoirs of older bears in the more remote areas of this Unit where hunting pressure is minimal. Areas such as most of Subunit 14B, Chugach State Park or the southwestern portion of 14A in the Little Susitna River drainage would provide such reservoirs. In these areas, access and hunting would be difficult.

For non consumptive use, dumps similar to those near Palmer, Wasilla and Talkeenta provide the only known viewing areas. There may be however, some streams such as the Chumilna River (Clear Creek) that could be designated as a viewing area.

Conflict with commercial cattle grazing has been, and will continue to be, a minor problem in the Matanuska Valley, especially near the foothills.

GAME MANAGEMENT UNIT 14

Brown-Grizzly Bear Sport Harvest, Calendar Years 1961 through 1975.

Calendar Year	Total Kill	No. Males	% 1/ Males	No. Nonres.	% Nonres.	Mean Hide 2/ Size Male	Mean Skull 3/ Size Male	Mean Age 4/ Male	Calendar Year Seasons
1961	14	6	43	7	50	12.3			9/1-9/30
1962	7	4	57	0	0	13.1			Same
1963	13	8	67	5	38.4	12.9	20.2		Same
1964	12	9	75	1	8	12.8	16.7		Same
1965	15	7	47	7	47	12.6	25.9		9/1-10/15
1966	5	2	40	2	40	13.4	28.1		9/1-9/30
1967	12	6	55	6	50	11.8	21.2		Same
1968	11	3	30	6	55	14.4	21.9		Same
1969	2	2	100	0	0	13.0	20.4	1.0(2)	9/20-10/20
1970	4	0	0	0	0	----	----	0	9/15-10/5
1971	16	6	38	4	25	11.8	18.0	3.0(6)	9/1-10/5
1972	4	2	50	0	0	12.5	14.7	4.8(2)	9/10-10/10
1973	1	1	100	0	0	10.7	0	2.8(1)	9/10-10/10
1974	3	1	50	0	0	10.6	16.8	3.8(1)	9/10-10/10
1975	5	4	80	1	20	14.4	19.4	9.8(4)	9/10-10/10

1) All male % based on known-sex bears. 3) Length plus width given in inches.

2) Length plus width given in feet.

4) Tooth sample size in parenthesis.

BROWN BEAR - UNIT 15 (KENAI)

Brown bears are low to moderate in abundance in Unit 15. Based on reported observations, the unit's total population is estimated between 75 to 150 bears (P. LeRoux, Area Biologist, A.D.F.&G., Soldotna, pers. comm.). The population appears to have been increasing in recent years.

High spring concentrations of bears on the upper Moose River Flats coincide with moose calving activities in the same area. There is little doubt that bears are attracted to these areas during the May-June calving period. The area not only produces several thousand moose calves each year, but also produces a large quantity of the more preferred spring plant foods such as sedges, grasses and horsetails.

Food habits and movements appear to be similar to those of Unit 8. Salmon spawning streams such as the Kenai, Kasilof, Deep Creek, Anchor, Fox and Chickaloon River drainages attract concentrations of bears in July-September.

Much of the alpine-subalpine zone is important bear habitat during summer and fall. Denning does not appear concentrated in any particular area.

Due to the abundance of undeveloped lowlands along the west side of the Kenai Peninsula, this species has no requirement to utilize the coastal fringe, with the possible exception of the Chickaloon Flats.

Harvest from this unit is entirely sport motivated (P. LeRoux, pers. comm.). Harvest since 1961 has averaged 4.73 bears annually with 23% taken by non-residents.

Most of the bear habitat in this unit is currently either undeveloped or under wildlife oriented land use classification.

However, with a significant portion of the Kenai Peninsula transferring to private ownership under the Native Land Claims Selection Act, the future of this area is uncertain. Recreational and industrial development will, in addition to decreasing available range, increase human bear conflicts and hunter accessibility. Both factors will result in higher incidental kill.

GAME MANAGEMENT UNIT 15 (KENAI)

Brown-Grizzly Bear Sport Harvest, Calendar Years 1961 through 1975.

Calendar Year	Total Kill	No. Males	% Males ^{1/}	No. Nonres.	% Nonres.	Mean Hide Size Male ^{2/}	Mean Skull Size Male ^{3/}	Mean Age Male	Calendar Year Seasons
1961	4	2	50	0	0	17.5			9/1-9/30
1962	5	2	40	3	60	11.4			Same
1963	4	2	50	0	0	12.8			Same
1964	2	2	100	2	100	12.8	23.3		Same
1965	3	1	33	1	33	13.1			Same
1966	4	1	25	1	25	17.3			Same
1967	4	2	50	1	25	15.4	24.5		Same
1968	11	7	64	1	9	14.4	22.2		Same
1969	6	4	67	0	0	14.3	24.8	6.8(2)	Same
1970	4	2	50	1	25	15.2	26.2	7.8(1)	9/20-10/15
1971	3	2	67	0	0	12.8	19.1	2.8(2)	9/20-10/15
1972	2	1	50	0	0	0	23.7	3.8(1)	9/10-10/10
1973	6	3	50	3	50	13.7	21.0	4.8(3)	9/10-10/10
1974	8	5	63	2	25	13.1	17.9	7.8(3)	9/10-10/10
1975	5	3	60	0	0	13.4	23.8	3.8(2)	9/10-10/10

1) All male % based on known-sex bears.

2) Length plus width given in feet.

3) Length plus width given in inches.

4) Tooth sample size in parenthesis.

BROWN BEAR - UNIT 16 (LOWER SUSITNA)

Brown bear are found throughout Unit 16 in moderate to high densities. Although precise data on the population is lacking, the subjective impression of Jack Didrickson (Area Biologist, A.D.F.&G., Palmer, pers. comm.) indicates 100 and 300 bears to be the population in subunits 16A and 16B respectively. The population generally appear to be static.

Very little is known about the food habits of bears in the unit, however, because of vegetative similarities, it is expected that they are similar to those of bears in Units 8 and 9. Early spring food is relatively abundant, with broad expanses of sedge meadows, grass flats and potholes providing an abundance of early green plants. Carrion left from hunter and winter kills further supplements spring brown bear diets. Moose calves and rodents are probably also important.

High spring densities of brown bear have been noted in the Bachatna Flats region. It may be that the surrounding mountainous geography of this area serve to concentrate the bears onto this spring habitat in a manner similar to areas in Kamishak Bay (Unit 9).

By early summer, salmon are important to brown bears in Unit 16. Red salmon appear in July and August and bears frequent Lewis River, Talachulitna Creek, Fish Lake Creek, Alexander Creek, and Coal Creek. King salmon arrive in July and August in many of the streams and are often available later into the fall on the spawning grounds. Silver salmon and a few pink salmon also spawn in the unit, and the later run silvers may provide a major food supplement in the fall.

Although denning activities have not been studied in this unit, habitat requirements are probably similar to those on the Alaska Peninsula (Unit 9). Bears in Unit 16 appear to den earlier and emerge a little later than those on the Peninsula. The Chigmit Mountain region surrounding Bachatna Flats is suspected to contain prime denning habitat.

As in other units, the alpine-subalpine zone is important for summer and fall feeding as well as for denning.

Sport harvest from this unit has averaged 29 bears annually since 1961; with non-residents accounting for 57%. Apparently the result of a reduction in the length of the fall season, harvest from the years 1972, 1974 and 1975 have been below average. The population is considered capable of supporting the level of harvest from recent years.

Harvest for domestic use is very rare in this unit. Also, the potential for non-consumptive uses of brown bear in this unit is considered to be low.

Generally, impacts on this population will be the result of human encroachment reducing range and available food. This may occur indirectly, for example, by impacting a salmon run or by reducing moose range and, consequently, the moose calf crop (J. Didrickson, pers. comm.). Both are significant seasonal food resources to the brown bear. Likewise, recreational and industrial development will, in addition to decreasing available range, increase human-bear conflicts and hunter accessibility. Both factors result in a higher incidental kill.

GAME MANAGEMENT UNIT 16 (LOWER SUŠITNA)

Brown-Grizzly Bear Sport Harvest.

Calendar Year	Total Kill	No. Males	% 1/ Males	No. Nonres.	% Nonres.	Mean Hide 2/ Size Male	Mean Skull 3/ Size Male	Mean Age 4/ Male	Calendar Year Seasons
1961	29	11	41	19	66	12.7	21.7		5/15-6/15, 9/1-12/31
1962	18	9	50	10	83	12.1			Same
1963	27	18	69	11	41	13.0	23.6		Same
1964	19	13	68	9	47	12.7	22.8		Same
1965	37	22	73	19	51	13.5	22.5		Same
1966	28	11	41	14	52	13.2	24.4		Same
1967	25	11	48	16	64	14.1	22.6		Same
1968	23	16	70	16	70	14.4	22.0		Same
1969	37	23	62	17	46	14.1	22.0	6.8(22)	5/15-6/15, 9/1-10/15
1970	41	32	80	28	68	14.0	22.1	6.8(28)	5/15-6/10, 9/1-10/15
1971	41	20	51	20	49	13.0	20.9	5.1(18)	5/15-6/10, 9/1-10/15

continued

- 1) All male % based on known-sex bears.
- 2) Length plus width given in feet.

- 3) Length plus width given in inches.
- 4) Tooth sample size in parenthesis.

GAME MANAGEMENT UNIT 16

(continued) Brown-Grizzly Bear Sport Harvest.

Calendar Year	Total Kill	No. Males	% Males	No. Nonres.	% Nonres.	Mean Hide Size Male	Mean Skull Size Male	Mean Age Male	Calendar Year Seasons
1972	23	13	59	11	48	13.6	23.6	8.0(12)	5/15-6/10, 9/10-10/10
1973	43	24	60	24	56	12.9	22.0	6.5(24)	5/10-5/25, 9/1-10/10
1974	24	14	64	16	67	13.2	22.2	6.6(14)	5/10-5/25, 9/10-10/10
1975	19	8	42	8	42	13.5	20.4	7.2(8)	5/10-5/25, 9/10-10/10

SELECTED REFERENCES

- Alaska Department of Fish and Game. 1973. Alaska's Wildlife and Habitat. Anchorage, Alaska. 143 pp + 563 maps.
- Alaska Department of Fish and Game. 1975. A fish and wildlife resource inventory of the Northwest Gulf of Alaska. Vol. I and II (411 pp, 757 pp. + 128 maps).
- Alexander, J. 1971. Brown-grizzly bear survey-inventory progress report. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____ 1973. Brown-grizzly bear survey-inventory progress report. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- Burt, W.H. and R.P. Grossenheider. 1952. A field guide to the mammals. Houghton Mifflin Co., Boston. 284 pp.
- Didrickson, J.C. 1970. Brown-grizzly bear survey-inventory progress report. Game Management Units 14 & 16. Alaska dept. of Fish and Game. Fed. Aid Proj. W-17-2.
- _____ 1971. Brown-grizzly bear survey-inventory progress report. Game Management Units 14 & 16. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____ 1973. Brown-grizzly bear survey-inventory progress report. Game Management Units 14 & 16. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- Dufresne, F. 1946. Alaska's animals and fishes. A.S. Barnes and Co., N.Y. 279 pp.
- Eide, S. The brown-grizzly bear in Alaska. Alaska Dept. of Fish and Game. Wild. Notebook Series No. 7. 2 pp.
- Erickson, A.W. 1963. Bear report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-6-R-4.
- _____ and D.B. Siniff. 1963. A statistical evaluation of factors influencing aerial survey results on brown bear. Trans, N. Am. Wild. Conf. 28:391-409.
- _____ 1965. The brown-grizzly bear in Alaska. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-6-R-5.
- _____ et al. 1968. The breeding biology of the male brown bear. Zoologica. 53(3):85-101.

- Faro, J.B. 1970. Brown-grizzly bear survey-inventory progress report. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-2.
- _____ 1971. Brown-grizzly bear survey-inventory progress report. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____ 1973. Brown-grizzly bear survey-inventory progress report. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- _____ 1974. Brown-grizzly bear survey-inventory progress report. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- Glenn, L.P. and L.H. Miller. 1970. Report on 1969 brown bear studies. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-2.
- _____ 1971. Report on 1970 brown bear studies. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-2, 3.
- Hall, R.E. and K.R. Kelson. 1959. The mammals of North America. Roland Press. New York. Vol. I and II. 1,083 pp.
- Hensel, R.J. et al. 1969. Reproduction in the female brown bear. J. Wild. Mgt. 33(2):357-365.
- IUCN. 1972. Bears - their biology and management. Papers and proc. of the Intl. Conf. on bear res. and mgt. New Series No. 23. 371 pp.
- Lentfer, J.W. et al. 1966. Bear studies. Alaska Dept. of Fish and Game. Fed. Aid. Proj. W-6-R-6.
- _____ et al. 1967. Bear studies. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-15-R-1, 2.
- _____ et al. 1968. Bear studies. Alaska Dept. of Fish and Game. Fed. Aid. Proj. W-15-R-2, 3.
- _____ et al. 1969. Report on 1968 brown bear studies. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-16-R-3 and W-17-1.
- LeRoux, P.A. 1970. Brown-grizzly bear survey-inventory progress report. Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid proj. W-17-2.
- _____ 1971. Brown-grizzly bear survey-inventory progress report. Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____ 1973. Brown-grizzly bear survey-inventory progress report. Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.

_____ 1974. Brown-grizzly bear survey-inventory progress report.
Game Management Unit 15. Alaska Dept. of Fish and Game. Fed. Aid
Proj. W-17-6.

Manville, R.H. and S.P. Young. 1965. Distribution of Alaskan mammals. U.S.
Fish and Wildlife Ser. Cir. 211. 74 pp.

Smith, R.B. 1974. Brown-grizzly bear survey-inventory progress report.
Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid
Proj. W-17-6.

Somerville, R.J. 1965. An evaluation of the 1961-63 Alaskan brown and
grizzly bear management program. M.S. Thesis. U. of Montana. 117 pp.

Walker, E.P. et al. 1964. Mammals of the world. John's Hopkins Press.
Baltimore. Vol. I and II. 1,500 pp.

CARIBOU

The barren ground caribou (Rangifer tarandus) is generally associated with the arctic tundra, mountain tundra and northern forests of North America, Russia and Scandinavia. This species has been a distinctive part of the Alaskan fauna for thousands of years and is resident throughout the state except for the Southeastern Panhandle and most offshore islands.

Caribou are large, rather stout deer with large, concave hoofs that spread widely to support the animal in snow and soft tundra and function well as paddles when it swims. Caribou are the only members of the deer family in which both sexes grow antlers. Antlers of adult bulls are large and massive; those of adult cows are much shorter and are usually more slender and irregular. In late fall caribou are clove-brown in color with a white neck, rump and feet, and often a white flank stripe. The hair of newborn calves is generally reddish-brown but may range from pale beige to dark brown. Newborn calves weigh approximately 13 pounds and may double their weight in 10-15 days. Adult bulls weigh 350-400 pounds; however, weights of 700 pounds have been recorded in the Aleutian Islands. Mature females average 175-225 pounds.

The shedding of velvet in late August and early September by large bulls marks the approach of the rutting season. The bulls cease feeding and show increasing aggressiveness that soon results in combat. Fights between bulls are seldom violent and injuries are uncommon. The peak of the breeding period in Alaska varies somewhat between herds, but most occurs in October. Most yearlings are capable of breeding but the first breeding usually occurs at an age of 28-29 months. By late October adult males have exhausted their summer accumulation of fat and once again begin feeding. Bulls start to shed their antlers after the rut and most adult

males are "bald" by January. Pregnant cows and young animals retain their antlers until May or June, but non-pregnant females usually shed their antlers in April.

As the spring migration begins, females and many calves of the previous year congregate as they move to the calving area. In late May or early June a single calf is born. Newborn calves can walk within an hour and after a few days can outrun a man and swim across lakes and rivers.

Like most herd animals, the caribou must keep moving to find adequate food. This distributes feeding pressure and tends to prevent overgrazing. Caribou are not as likely to starve to death as moose or deer because if food is not available in one area, they move to another.

In summer, caribou eat a wide variety of plants, apparently favoring the leaves of willow and dwarf birch, grasses, sedges and succulent plants. As autumn frost kills off plants and foliage, they switch to lichens ("reindeer moss") and dried sedges. After a winter of lichens and dried food, caribou seek out the first new growth of spring.

The Alaskan caribou is largely a mountain animal, associated with areas above or near timberline, but its movements are extensive and unpredictable. Areas known for many years to have great numbers may suddenly be abandoned as the herd changes its migration pattern. Such irregularities even today cause privation among the native people in Alaska and Canada who depend upon caribou for food.

Annual caribou migrations are generally directional, long-distance treks occurring in spring and early summer as cows and young move to traditional calving grounds and then to summering areas. The bulls and some young animals follow far to the rear and scatter widely during the summer. In the fall and early winter, the herd assembles for the rut and then moves to wintering grounds.

There are more than 600,000 wild caribou in Alaska distributed in 13 more or less distinct herds. At present the herds are healthy and increasing steadily, but the future can only bring a decrease in numbers. As civilization encroaches and the back country is developed, more and more valuable caribou habitat will be lost.

CARIBOU - UNIT 9 (ALASKA PENINSULA)

The Alaska Peninsula caribou herd presently ranges over an area of about 30,000 square miles extending from Naknek Lake southwest to and including Unimak Island (Unit 10). The herd has increased in numbers from a recent low of about 2,500 animals in the late 1940's to a present population of approximately 23,000. This herd consists of three segments: one north of Port Moller; one south of Port Moller; and one ephemeral population on Unimak Island.

In the mid-1800's caribou were abundant on coastal areas near Bristol Bay and along both sides of the Alaska Peninsula. Trading posts at Fort Alexander (at the mouth of the Nushagak River) and at Ugashik did a brisk business in caribou skins. At that time caribou moved seasonally on and off the peninsula. By the turn of the century, however, large migrations across the Kvichak River had stopped and caribou moved only as far north as Becharof Lake.

Today, their occurrence in the Pacific coastal drainages is only occasionally noted in the areas south of Katmai National Monument. This low level usage of the Pacific coastal region precludes defining any specific habitats as critical; however, increased ranging through this area is anticipated by extrapolating the current population growth (Jim Faro, A.D.F.&G., King Salmon, Alaska, pers. comm.).

Likewise, coastal sport and subsistence harvest is insignificant.

CARIBOU - UNIT 15 (KENAI)

Caribou occurred on the Kenai Peninsula until the early 1900's. Apparently, loss of habitat to extensive fires and intensive hunting around the turn of the century caused the species to decline rapidly. Caribou were extinct in the area around 1913.

In the early 1950's, the Fish and Wildlife Service conducted feasibility studies to determine if historic caribou ranges on the Kenai Peninsula could again support caribou. Suitable range was found in the Chickaloon River-Mystery Creek area, the Skilak-Tustumena Lake area and the Caribou Hills north of Homer. These areas were reappraised in 1964 by the Alaska Department of Fish and Game, which then released 15 caribou near the Chickaloon River in May, 1965. In April, 1966, 29 more were released at Watson Lake near Sterling. These transplants were highly successful and in the years since 1966, caribou were observed at scattered points over the entire western half of the Kenai Peninsula.

At the present time, the largest group (about 400 animals) is resident in the northern Kenai Mountains south of Hope, between the headwaters of Resurrection Creek and the Chickaloon River (i.e. - the American Pass herd). A smaller band of 60-75 caribou winters on the Moose River Flats, and then calves and summers on the lowlands just north of the Kenai Airport (i.e. - the Kenai herd) (P. LeRoux, Area Biologist, A.D.F.&G., Soldotna, pers. comm.).

The American Pass herd has done well on its limited range. Recent studies have established the carrying capacity of the range at roughly 300 wintering Caribou. Studies are currently in progress to refine this estimate.

During the first years of hunting on this population, a limited permit system was in effect to control the level of harvest. Due to the inaccessibility of the area, hunters failed to harvest the annual population growth. Fearing the population exceeding the carrying capacity and thereby damaging the range, an unlimited permit system was initiated in 1974. Hunter response has been excellent with 869 permits issued in 1975 and 87 Caribou taken. The net result of this management action has achieved the desired wintering population of approximately 300 animals.

Considering the difficulties in access to the area, strong recreational values are implied as the primary harvest motive. In most cases, the meat is salvaged for domestic use.

The remainder of the Kenai Peninsula is judged to be either poor or uninhabitable range for caribou. This accounts for the slow growth of the Kenai herd and the disappearance of caribou that inhabited the areas south of the Kenai River following the transplants (P. LeRoux, Area Biologist, A.D.F.&G., Soldotna, unpublished data).

The Kenai herd generally move to their wintering grounds on the Moose River Flats in November or December. They return to the muskeg area north of the Kenai Airport usually in April and no later than early May. Here calving occurs. There is currently no open harvest season on this herd.

A fence is being constructed around the airport to reduce potential conflicts.

CARIBOU HARVEST - UNITS 7 AND 15 (Kenai)
American Pass Herd

Caribou seasons, permits issued harvest by sex and hunter success.

<u>Year</u>	<u>Season</u>	<u>Permits Issued</u>	<u>Harvest</u>		<u>Total</u>	<u>Percent Successful</u>
			<u>Male</u>	<u>Female</u>		
1972-73	Aug. 10 - Nov. 30	20	6	0	6	30.0
1973-74	Aug. 10 - Nov. 30	100	10	1	11	11.0
1973-74	Jan. 1 - Jan. 31	50	1	0	1	2.0
1973-74	Feb. 1 - Feb. 28	50	0	0	0	0.0
1973-74	March 1 - March 31	50	0	0	0	0.0
1974-75	Aug. 10 - Nov. 30)	573*	30	14	44	7.7
	Jan. 1 - March 31)					
1975-76	Aug. 10 - Nov. 30)	869*			87	
	Jan. 1 - March 31)					

* Unlimited permits

Chronology of the caribou harvest, American Pass group. 1974-75.

	<u>August</u>		<u>September</u>			<u>October</u>		
	<u>10-20</u>	<u>21-31</u>	<u>1-10</u>	<u>11-20</u>	<u>21-30</u>	<u>1-10</u>	<u>11-20</u>	<u>21-31</u>
Male	8	8	11	1	0	2	0	0
Female	6	5	2	0	1	0	0	0
Total	14	13	13	1	1	2	0	0
	<u>November</u>	<u>January</u>	<u>February</u>	<u>March</u>				
Male	0	0	0	0				
Female	0	0	0	0				
Total	0	0	0	0				

CARIBOU HARVEST - UNITS 7 & 15 (KENAI)
American Pass Herd

Caribou seasons, permits issued, harvest by sex and hunter success.

<u>Year</u>	<u>Season</u>	<u>Permits Issued</u>	<u>Harvest</u>		<u>Total</u>	<u>Percent Successful</u>
1972-73	Aug. 10 - Nov. 30	20	6	0	6	30.0
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1973-74	Jan. 1 - Jan. 31	50	1	0	1	2.0
1973-74	Feb. 1 - Feb. 28	50	0	0	0	0.0
1973-74	March 1 - March 31	50	0	0	0	0.0
1974-75	Aug. 10 - Nov. 30					
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Chronology of the caribou harvest, American Pass group, 1974-75.

		<u>August</u>		<u>September</u>			<u>October</u>		
	<u>10-20</u>		<u>21-31</u>	<u>1-10</u>	<u>11-20</u>	<u>21-30</u>	<u>1-10</u>	<u>11-20</u>	<u>21-31</u>
	8		8	11	1	0	2	0	0
	6		5	2	0	1	0	0	0
Total	14		13	13	1	1	2	0	0
		<u>November</u>		<u>January</u>		<u>February</u>	<u>March</u>		
		0		0		0	0		
		0		0		0	0		
Total		0		0		0	0		

SELECTED REFERENCES

- Alaska Game Commission. 1952. Investigation to determine practicability of reestablishing caribou on the Kenai Peninsula. Fed. Aid in Wildl. Restoration Quarterly Rpt., 7(2);60-63.
- Allen, J.A. 1901. Description of a new caribou from Kenai Peninsula, Alaska. Bull. Am. Mus. Nat. Hist., 14:143-148.
- Banfield, A.W.F. 1951. The barren-ground caribou. Can. Wildl. Ser., Dept. Res. and Dev., Ottawa. 56 pp.
- Glenn, L.P. 1967. Caribou report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-15-R-1 and W-15-R-2.
- Hemming, J.E. 1971. The distribution and movement patterns of caribou in Alaska. Alaska Dept. of Fish and Game. Wildl. Tech. Bull. No.1.
- Hemming, J.E. and L.P. Glenn. 1968. Caribou report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-15-R-2.
- _____. 1969. Caribou report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-15-R-3 and W-17-1.
- Hemming, J.E. and R.E. Pegau. 1970. Caribou report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-1 and W-17-2.
- LeRoux, P.A. 1973. Caribou survey-inventory annual report. Game Mgt. Units 7 & 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- _____. 1974. Caribou survey-inventory annual report. Game Mgt. Units 7 & 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-5.
- _____. 1975. Caribou survey-inventory annual report. Game Mgt. Units 7 & 15. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- McGowan, T.A. 1966. Caribou report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-6-R-6 and W-15-R-1.
- Murie, O.J. 1959. Fauna of the Aleutian Islands and Alaska Peninsula. N. Am. Fauna, No. 61, U.S. Dept. of Agr. 406 pp.
- Skoog, R.O. 1968. Ecology of the caribou Rangifer tarandus granti in Alaska. Ph.D. Thesis. Univ. California, Berkeley. 699 pp.

REINDEER - UNIT 8 (KODIAK - AFOGNAK)

Sixty-two reindeer were introduced at Alitak on the south end of Kodiak Island in 1921 by the Bureau of Indian Affairs. An aerial survey in May, 1963 by USFWS and ADF&G found 768 animals. An additional survey in July, 1965 located 553 animals. No formal census has since been attempted but the current population is estimated to number approximately 300 and is declining.

Management of this species population has been termed as "management by neglect." Due to legalistic issues stemming from the original private ownership by the Alitak Reindeer Company (1931) and the stated interests by current Alitak village residents, ADF&G (current "managers" by default) are necessarily reluctant to initiate management actions on the species.

From the ADF&G viewpoint, the species is feral; active herding has not been attempted since 1942. The cause for the decline of the population is unknown but is suggested to be the result either a misappropriate transplant onto bad habitat or perhaps the results of a current high density of brown bears occupying the same range (R. Smith, Area Biologist, A.D.F.&G., Kodiak, pers. comm.). The choice remains whether to try to enhance the species with an additional transplant of caribou bulls (i.e., bolster their "semi-domestic" gene pool) or to simply allow natural depletion. Theoretically, a predator control program might assist the species overall productivity, however; this would be in direct conflict with the objectives of brown bear management within the Kodiak National Wildlife Refuge.

Sport harvest is essentially non existant due to the inaccessibility of the area. Subsistence harvest by local villagers and fishermen is estimated to take fewer than 25 animals each year. There are no closed seasons or bag limits on the species.

SITKA BLACK-TAILED DEER

The Sitka black-tailed deer (Odocoileus hemionus sitkensis) is one of eleven subspecies belonging to the mule deer group. The closest relative of the Sitka black-tailed deer is the Columbian black-tailed (Odocoileus hemionus columbianus), considered by some to be the same species.

The Sitka deer is smaller and stockier with a shorter face than other members of the black-tail group. Summer coat is reddish-brown replaced by dark grey in winter. Both sexes have dark foreheads, shading to light grey. The tail is black on top with a white underside. Alaskan deer have dark-brown antlers with typical black-tail branching (usually five points on each side). The antlers are relatively small, probably due to a mineral deficiency in their diet. Largest antler development normally occurs on four- and five-year-old bucks.

The average life span of most deer is only five to six years, but a few have been known to attain an age of 12. Adult does weigh about 100 pounds and bucks range from 150-175 pounds, with the largest bucks reaching 250 pounds.

The Sitka black-tailed deer was previously confined to the heavily timbered region of the north coast of British Columbia and southeastern Alaska. Several transplants have increased deer range to various places around the northeast Gulf of Alaska. Successful transplants took place on Kodiak Island in 1924 and in Yakutat Bay in 1934. These successful transplants show that Sitka deer can survive in a variety of habitats.

Generally, Alaskan deer habitat is steep and mountainous, usually rising from sea level to 5,000 to 7,000 feet. The climate is maritime with temperatures ranging from -10° to 70°F, with Kodiak Island generally cooler. The annual precipitation is between 80-120 inches per year.

The Sitka deer spends most of its life in a single drainage, moving up and down mountains with changing seasons. Merriam (1967) states 14 tag returns showed 11 deer travelled 1 mile or less, and the others travelled 8, 12, and 15 miles. One buck which was tagged as a fawn in June, 1962 was killed in November, 1966 within one-half mile of the original tagging site. During summer months deer migrate to open alpine ranges. After the first heavy frosts of fall, deer move down into high timber. Throughout the winter, the majority of deer remain just below snowline, moving up and down with changing snow depths. When snow is deep, most deer stay in a narrow zone adjacent to beaches.

Sitka black-tail populations fluctuate depending on winter weather conditions. A series of mild winters tend to allow larger populations while many cold winters with high snowfall tend to decrease populations.

Breeding begins in mid-October, peaking in mid-November. In late August, bucks molt into winter pelage and begin to strip the velvet from their antlers.

By early September, most males are in breeding condition. Dominance is established during the rut by mild pushing contests, presentation of antlers, pawing and stamping. Violent clashes between bucks are uncommon. Bucks lose weight during the rut and by late December have exhausted most of their fat reserves. From October or November to early March, does are in heat every 24 to 28 days. Most females mature sexually and breed during their second autumn. If feeding conditions are excellent, does may breed in their first autumn whereas a poor year may delay breeding until their third autumn. Gestation period is roughly seven months. The fawning period extends from March to November with main concentrations in June. When bucks are

scarce, some females will not be breed until their second or third heat. When fawns are born in late summer, they are still small at the onset of winter and the females are still weak from nursing. Consequently both are susceptible to harsh winter conditions.

Fawns are usually born in fringes of trees adjacent to a lowland muskegs or beaches. They weigh from five to eight pounds at birth. During the first few weeks they gain weight rapidly. They are reddish-brown with a line of white spots along the back and scattered spots on the sides. By late August or September the spots begin to disappear.

Most does give birth to a single fawn, but there are incidents of twins. Almost immediately after birth fawns use some vegetation and by September can live without milk. Fawns remain with the doe throughout the winter. If food is scarce, does will drive fawns away from choice food. Fawn survival during the first year depends upon abundance of food and winter weather. Severe winters may reduce fawn survival to almost zero. Predation seems to be a minimal factor in fawn survival, although black bears, brown bears, grizzly bears, bald eagles, wolves, wolverines, lynx and coyotes occasionally prey on fawns.

Maternal ties begin to break in late spring, and are usually broken after one year. At this time yearling pairs begin to form. Pairs seen throughout summer and into the rutting season are often mistaken for twin fawns of the previous year.

The Sitka deer is polygamous, which allows for an unbalanced sex ratio between mature adults. The harvest of deer may be selective without effecting productivity of the population. Unbalanced sex ratios create a distribution of food during the winter which aid the does because there are usually more bucks harvested than does.

Deer are not gregarious, adults are sexually segregated for most of the year. Family groups, if present, usually include several does with fawns (occasionally with a young buck), and groups of bucks (2-8, normally 2-4). These groups are normally seen converging on a central feeding area. Yarding seldom occurs except in deep snow.

Depending on the season, Sitka deer will vary their utilization of herbaceous and grass-like plants. Deer congregate on the beaches in spring utilizing new shoots of beach grasses, sedges and plantain. As the snow recedes, skunk cabbage, marsh marigold and salmon berry and blueberry leaves become primary foods. Deer cabbage is the major food while the deer are in the high country. During July the deer again move into the high timber and alder slides where they feed on the leaves and young shoots of salmon berry and black currant. Deer will use these low-growing herbs when available in the winter months. Woody plant species (browse) such as blueberry become important with snow cover. Browse alone does not constitute an adequate diet, and it must be supplemented with herbs. With very deep snow deer are forced to the open beaches to feed on dry beach grass and kelp both of which are very low quality and provide little nutrition.

DEER - UNIT 8 (KODIAK - AFOGNAK)

Since the original transplant in the early 1930's, the deer on Kodiak have faired quite well. The current population is estimated to number between 15,000 and 20,000 and is still expanding its distribution on Kodiak proper (R. Smith, Area Biologist, A.D.F.&G., Kodiak, pers. comm.). Although their presence is reported throughout Kodiak, historically, high density wintering areas were only noted in the northern coastal regions. Presently, these areas are displaying a trend of southerly progression down the coasts as far as Uyak Bay on the west side and the outer southern shores of Ugak Bay on the east side. The west side's expansion appears to be progressing quicker due to the availability of better browse.

Deer also occur throughout Afognak although competition with elk for winter range has probably reduced their potential population. During recent years, the elk population declined and a corresponding increase in deer numbers was noted.

During winter, depending on snow conditions, the deer may be subjected to a critically stressful period in which excessive snowfall inhibits their ability to travel about and find food. Lack of food will force them to lower and lower regions until they may eventually be concentrated along the beach fringe or actually onto the beach. Any factor affecting the availability of browse in this critical winter habitat (e.g. competition with cattle or elk, human encroachment or high deer densities) will result in excessive winter mortalities.

Around the Chiniak Peninsula, open range cattle grazing presents stiff competition for deer populations. Under present ranching methods,

little supplemental feed is provided for the cattle which then rather nonselectively must feed on the same winter browse as the deer. Current ranching interests appear to be yielding marginal returns and their future remains uncertain.

On Afognak, where deer and elk are found in overlapping winter habitats, the deer's lighter weight enables it to traverse snow depths more readily than elk and thus feed at higher elevations. During severe winters however, both species may be forced onto the beach fringe.

It is suggested that the weaker animals of the herd will differentially be displaced to the lower elevations, leading to a succession of the weakest animals appearing on the beach. First, the sick animals appear, followed by fawns, then old bucks (depleted by rutting) and finally, old does while the healthy animals remain in the fringe areas coping with the snow (J. Alexander, Game Biologist, A.D.F.&G., Anchorage, pers. comm.). Feeding occurs in the intertidal region on various macroalgae, however, disagreement exists regarding whether these animals are feeding in a marginal survival state or are truly there by choice (i.e., kelp possesses low nutritional value).

The nutritional quality of browse is perhaps equally as important as the quantity.

A stomach content study done by J. Alexander (A.D.F.&G., unpublished data, 1968) indicates...."The number and quality of plant species utilized by deer in non-spruce areas was much greater than the number and quality of plants used in spruce wintering areas." These feeding differences generally correspond to the habitat differences between the east (spruce) and west (non-spruce) coastal areas.

Describing the major food species...."The use of crowberry (Empetrum nigrum), increased from 9% of the rumen contents in December to 48% in March, in non-spruce habitat types. Fireweed (Epilobium angustifolium), also increased in rumen samples from 17% to 42% during the same period. Shrubs

were the third most important food items observed. Use of willow (Salix sp.), increased from 7% to 29% and elderberry (Sambucus racemosa), 14% to 22% between December and March.

"Of the 12 plant species observed in rumens collected from deer inhabiting spruce areas, several such as kelp, alder (Alnus fruticosa) and spruce (Picea sitchensis), are considered to be of little nutritional value. The percent of volume of spruce increased from 36% in December to 53% in March. Likewise, kelp increased from a trace to 44% in the same period. The percentage of willow increased in volume but decreased in frequency of occurrence, suggesting perhaps a decrease in availability during peak snow depths."

Supported by this study, a general feeling exists that a combination of better winter browse and climatic conditions creating wind swept areas has enabled the development on the west coast of a more vigorous population, less prone to winter fluctuations (J. Alexander, and others, pers. comm.).

With melting snows of late spring, deer tend to follow the snowline back up into the subalpine and alpine zones feeding on various emerging forbs, flowers and greens. Although the summer range extends from tidewater to the alpine zone, the main population will predominately remain in the higher elevations. Generally, a small range is suspected (R. Smith, pers. comm.).

Deer utilize many plants in Unit 8 not generally considered important in other units. Fireweed is probably the most important summer food but deer also use grasses, wild rose, elderberry and salmonberry. Some blueberry is present under spruce cover, but rarely occurs in the abundance normal to Prince William Sound and southeast Alaska.

Other plant species used less extensively on summer range include highbush cranberry, bearberry, crowberry and cow parsnip. Some ground dogwood is present, but it is not as important to deer here as in other areas of Alaska.

Deer will range through the higher elevations until the first hard freeze. At that time the forage dessicates and the population begins moving down; usually by late September (R. Smith, pers. comm.). under unique weather conditions deer have been observed in light dry snow at 1,200-1,800 feet elevation and did not descend lower until the wet heavy snows of March (J. Alexander, pers. comm.).

The harvest might best be described as a "recreational subsistence" effort. It is likely that nearly all of the animals taken were utilized for meat, however; the efforts of over 2,000 licensed hunters averaging 3.7 days hunting per deer (1974) and the expense of transportation to and from hunting areas implies strong recreational values. Further indication of recreational values lie in the fact that only 61% of the hunters were successful in their efforts and that the hunt was at least partially selective in harvesting 62% bucks. "Subsistence" motives are implied from the figure of 69% of the successful Kodiak hunters taking more than one deer and from non-resident hunters comprising less than 3% of the statewide efforts.

Historically, the harvest effort has put heavy pressure on the populations within easy access of the road system around Kodiak. These populations declined and now are under tighter season and bag limit regulations.

Currently, hunting pressure is dispersed through various subunits (see figure) with the majority of the harvest occurring between October and December. Boats were used for 56% of the harvest indicating a strong effort from local fishermen. The current level of total harvest is considered to have only light impact on the deer populations.

Several potential threats exist which will likely impact the population. However, considering the increasing numbers and expanding range the effects will likely be localized. Primarily, the Native Land Claims selections will place approximately two-thirds of the island group lands under private ownership including nearly the entire coastal regions. Any development of these areas may reduce critical winter habitat and increase incidental kill. Secondly, increased hunter success is anticipated from improved accessibility to remote areas via present and future logging developments.

Unit 8 - Deer Harvest Statistics, 1966 - 1974

	1967	1968	1969	1970	1971	1972	1973	1974
Number of Hunters:	1,800	2,300	1,441	658	925	689	1,127	1,141
Number of Deer Harvested:	1,500	2,100	1,420	870	915	587	1,166	1,754
% Hunter Success:	48	74	43	55	45	46	47	61
Number of Deer per Hunter:	.8	.9	1.0	1.3	1.0	.85	1.0	1.5
Number of Hunting Days per Deer:	5.7	5.0	6.3	2.4	4.5	5.2	5.0	3.7

PREPARED BY: Roger B. Smith, Game Biologist III

UNIT 8 - DEER HARVEST STATISTICS, 1974

	<u>Number</u>	<u>Percent</u>
License Buyers	2,022	
*Licensee Interviews	234	11.6%
License Buyers Not Hunting	881	44%
Hunters Afield	1,141	56%
Females Harvested	665	38%
Males Harvested	1,089	62%
Total Deer Harvested	1,754	
Successful Hunters	700	61%
Days Hunted Per Deer	3.7 days	
Deer Per Hunter Afield	1.54 deer	
Deer Per Successful Hunter	2.51 deer	
Total Days Hunted	6,506	
Number and Percent Hunters Taking:		
One Deer	216	31%
Two Deer	156	22%
Three Deer	86	12%
Four Deer	242	35%
<hr/>		
Total	700	100%

* From telephone hunter interview; harvest figures extrapolated from 11.6% sample of license buyers. Survey conducted by Roger Smith and Ben Ballenger, A.D.F.&G., Kodiak.

CHRONOLOGICAL DISTRIBUTION OF THE 1974 DEER HARVEST

	Aug.	Sept.	Oct.	Nov.	Dec.	Total
No.	78	86	458	691	441	1,754
%	4.4%	4.9%	26.1%	39.4%	25.1%	99.9%

TRANSPORTATION UTILIZED

	Boat	Private Air	Air Taxi	Auto
%	56%	6%	21%	17%
No.	527	52	199	164

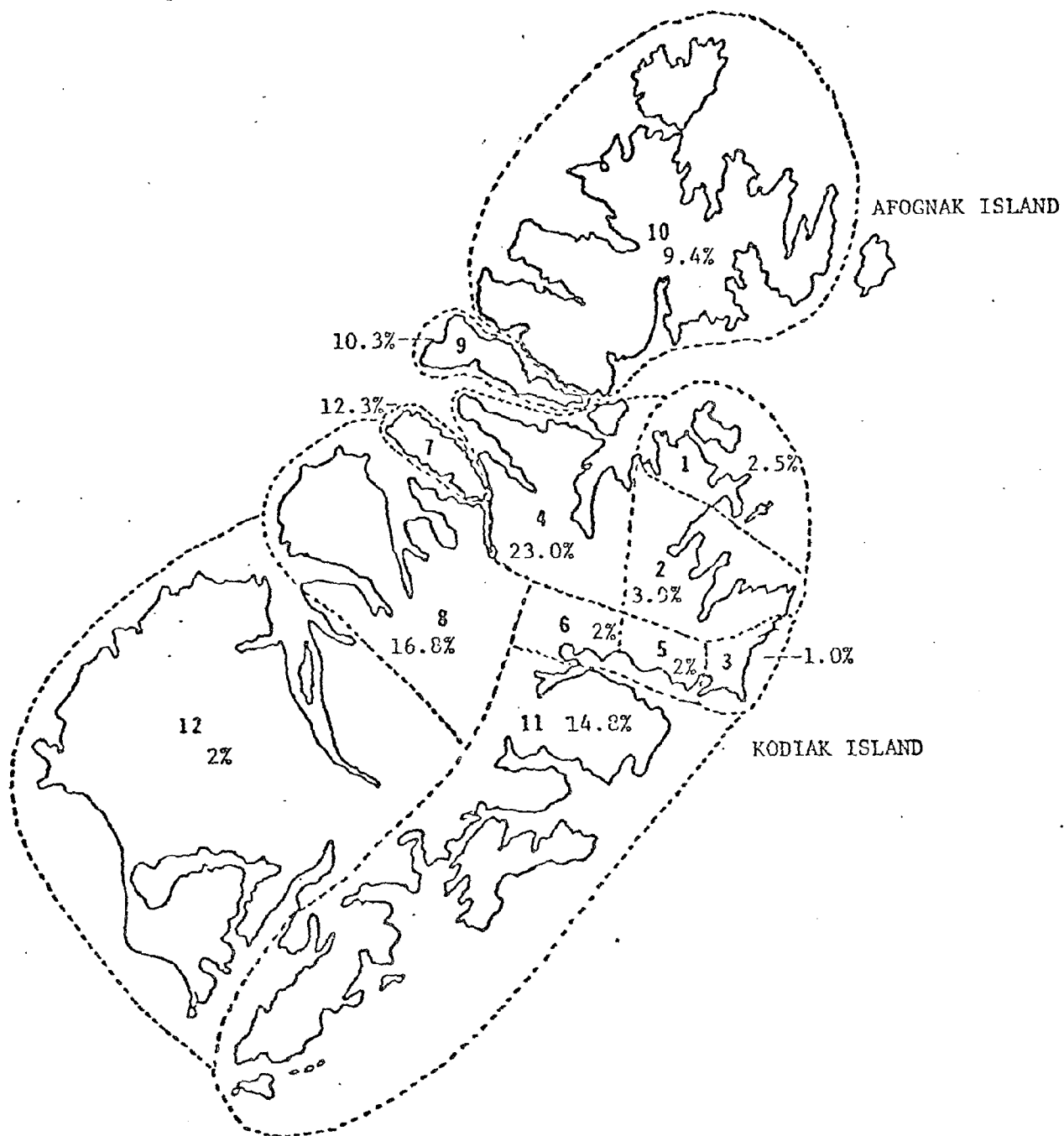
From telephone hunter interviews; harvest figures extrapolated from 11.6% sample of license buyers. Survey conducted by Roger Smith and Ben Ballenger.

DISTRIBUTION OF DEER HARVEST BY SUB-UNITS 1974

<u>Sub-Unit Number</u>			
1	Crag Point to Mill Bay.	43	2.5%
2	Sequel Point to Crag Point, drainage to Chiniak Bay.	69	3.9%
3	Sequel Point to Narrow Cape.	17	1.0%
4	Sharatin, Kizhuyak and Viekode Bays; Whale Island and Kupreanof Peninsula.	406	23.0%
5	Pasagshak Bay to Saltery Creek	35	2.0%
6	Saltery Creek to Hidden Basin.	35	2.0%
7.	Uganik Island.	216	12.3%
8	Little River Peninsula to Spiridon Bay.	294	16.8%
9	Raspberry Island.	181	10.3%
10	Afognak Island.	164	9.4%
11	South Ugak Bay and remainder of southeast side of Kodiak Island.	259	14.8%
12	Remainder of Kodiak Island south and west of Spiridon Bay.	35	2.0%
<hr/> Total		1,754	100.0%

From telephone hunter interviews, harvest figures extrapolated from 11.6% sample of license buyers. Survey conducted by Roger Smith and Ben Ballenger.

UNIT 8 - Distribution of Deer Harvest - 1974



SELECTED REFERENCES

- Alaska Department of Fish and Game. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 143 + 563 maps.
- _____. 1975. A fish and wildlife resource inventory of the Northeast Gulf of Alaska. Vol. I and II (411 pp., 757 pp. + 128 maps).
- Alexander, J.E. 1970. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-2.
- _____. 1971. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____. 1973. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- Burris, O.E. and D.E. McKnight. 1973. Game transplants in Alaska. Alaska Dept. of Fish and Game. Game Tech. Bull. No. 4. 57 pp.
- Burt, W.H. and R.P. Grossenheider. 1972. A field guide to the mammals. Houghton Mifflin Co., Boston. 284 pp.
- Cowan, I.M. 1956. The life and times of the black-tailed deer. In Taylor: The deer of North America. Wild. Mgt. Inst. Stackpole Co., 668 pp.
- Hail, R.E. and D.R. Kelson. 1959. The mammals of North America. Roland Press. New York. Vol. I and II. 1,083 pp.
- Manville, R.H. and S.P. Young. 1965. Distribution of Alaskan mammals. U.S. Fish and Wildlife Serv. Cir. 211. 74 pp.
- Merriam, H.R. 1965. Deer report. Alaska Dept. of Fish and Game. Fed. Aid. Proj. W-6-R-5, 6.
- _____. 1966. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-6-R-6 and W-15-R-1.
- _____. 1967. Deer report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-15-R-1, 2.
- _____. 1968. Deer report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-15-R-2, 3.
- _____. 1971. Deer report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-1.
- Palmer, L.J. 1944. Food requirements of some Alaskan game animals. J. Mammal. 25:49-54.

- Scott, R.F. and D.R. Klein. 1958. Sitka black-tailed deer studies.
Alaska Dept. of Fish and Game. Fed. Aid Proj. W-3-R-12.
- Smith, R.B. 1974. Annual report of survey-inventory activities. Game
Management Unit 8. Alaska Dept. of Fish and game. Fed. Aid Proj.
W-17-6.
- _____ 1976. Annual report of survey-inventory activities. Game
Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj.
W-17-7.
- Walker, E.P. et al. 1964. Mammals of the world. John's Hopkins Press.
Baltimore, Vol. I and II. 1,500 pp.

ELK

Alaska's present elk herds originated from a transplant of eight Roosevelt elk (Cervus canadensis roosevelti) calves from the Olympic Peninsula in Washington state to Afognak Island in 1928.

Elk are sometimes called wapiti to distinguish them from moose (Alces alces) which are termed elk in Europe. Roosevelt elk are larger, slightly darker in color and have shorter, less symmetrical but more massive antlers than the Rocky Mountain elk (Cervus canadensis nelsoni) which is found east of the Cascades in Canada and the United States.

Within Alaska, elk are found only on Afognak and Raspberry Islands near Kodiak although a transplant was made to Revillagigedo Island near Ketchikan in 1964. This transplant appears to have been a failure.

Elk share many physical traits common to deer, moose and caribou. They are much larger than deer, though not as large as Alaskan moose. Distinguishing features include a large yellowish rump patch, grayish to brownish body and dark brown legs and neck. Unlike some members of the deer family, both sexes have upper canine teeth. The males have antlers which in prime bulls are very large, sweeping gracefully back over the shoulder with dagger-like, light-tipped spikes pointing forward. Alaska elk antlers, like those of other Roosevelt elk, have a tendency to form two to three points at the end of each antler. Elk lose their antlers during late winter each year and grow new ones the following summer. The soft growing antler is covered with "velvet" which is scraped off after the antlers harden in the fall, by rubbing and jousting with saplings. When the antlers are hard and polished the bulls fight and joust among themselves. Cow elk are similar in appearance to the bulls but are usually smaller and have no antlers.

Bull elk on Afognak Island have been weighed at over 1,000 pounds dressed weight. These animals were estimated to weigh up to 1,300 pounds when alive.

Like most northern animals, calf elk are born in late May and early June when abundant food is available for the mother and mild weather increases the spotted calves' chances for survival. Birth usually occurs under cover of dense spruce forests, hidden from predators and protected from the elements. A few days after giving birth the mother joins other cow elk with calves. A single cow will often baby-sit with the calves while the remaining cows seek food.

As summer progresses, the elk bands move above timberline and feed on the alpine slopes where the breezes keep biting insects at bay and the young growth of plants is highly nutritious. By July the calves, although still nursing, will feed on succulent forbs.

In August the bands of elk begin to congregate and form herds. In early August the herds normally consist of cows, calves, yearlings and an occasional mature bull. Usually small bands of mature bulls are near, but not part of, the main herd. During September the bulls join the herd and mating activities begin. In herds numbering over 100 animals a great deal of activity takes place as large bulls challenge each other and occasionally begin pushing and shoving matches. The smaller yearling bulls often attempt to take advantage of the larger bulls' preoccupation and run past them to win the favors of a female. Bull elk frequently emit their high-pitched whistle during the rutting period. This is known as "bugling" and is an inspiring though eerie sound.

By mid-October most of the breeding activities have ceased and the herd may begin to split up and again go down to lower elevations. The winter months are spent along the fringes of the beaches, in the lower

valleys, and in the dense spruce forests. At this time the main activity of elk is searching for food.

Elk are hardy animals. However, their large size and herding tendencies require tremendous amounts of food. From late spring to early fall when a variety of food is available, elk are normally grazers, utilizing such plants as blue joint, sedges, fireweed, lupine, cow parsnip, sea lovine and chickweed. From late fall through early spring Alaskan elk are principally browsers and their main food consists of elderberry, highbush cranberry, willow, and devil's club sprouts. Alaskan elk like mushrooms and even chew on rotten logs. In some ways the elk may be its own worst enemy as large herds often kill their own food supply by stripping, trampling and eating too closely their staple winter supply of willow and elderberry. It is for this reason that it is important to keep elk herds from becoming too large in relation to the food supply.

Factors which work to reduce the growth of elk populations include a small amount of predation by brown bears, hunting, disease, starvation, and a lowered birth rate when animals are too numerous for the food supply to support.

ELK - UNIT 8 (AFOGNAK)

In Alaska, elk occur only in the northern Kodiak Archipelago on Afognak Island and nearby Raspberry Island. Established on Afognak Island in 1929 by a transplant of eight calves from Washington state, the elk population grew rapidly to an estimated 212 animals in 1948 and to a peak of 1,200-1,500 elk by 1965. As with other ungulate species, the availability of winter forage is critical to their survival. A decline associated with over-utilization of winter range began in the late 1960's. Unusually heavy snow accumulations and cold temperatures during the winters of 1970 and 1971 brought massive die-offs and by 1972, only about 450 animals remained. The elk populations appears to be gradually increasing by 5% to 10% annually and, in 1975, was estimated at about 600 animals (R. Smith, Area Biologist, ADF&G, Kodiak, pers. comm.). Even during recent relatively mild winters, however, losses to malnutrition have occurred and it is unlikely that mid-1960's population levels will be reached without significant improvements in habitat quality. It is estimated that the present habitat will only support between 500 to 800 elk.

Elk reached their highest population levels in the grass-shrubland areas of southwestern Afognak Island and Raspberry Island. Willow stands along streams and bogs and dense stands of elderberry provided abundant winter forage initially but were depleted when elk populations became excessive prior to the mid-1960's population crash. Supplementing these depleted grass-shrubland ranges, the understory vegetation found in mature spruce forests is presently an important source of winter forage for elk. Additionally, the mature forests provide cover for elk and the reduced sub-canopy snow depths allow easier access to forage.

Currently, the highest populations of elk winter in the densely forested central and easternmost parts of Afognak Island.

The spruce fringes near sea level appear to be especially critical habitat for elk during severe winters. When snow depths exceed two to three feet, elk tend to distribute themselves in forested areas 200 to 300 years from the beach. During milder winters, they may be found up to 200 feet above sea level. Winter severity has been and will continue to be the major population regulatory mechanism affecting Afognak's elk population, until such time as hunting becomes effective in controlling elk numbers.

The recorded harvest of this species is sport in nature, although domestic use of the meat is common. During 25 years of hunting, over 1,500 elk of both sexes have been harvested. When the population was at its highest, hunting was relatively successful. Harvests during the 1971-1975 period, however, have averaged less than 25 elk annually and hunter success has been less than 15%.

The largest elk populations now occur in interior and eastern Afognak Island where dense timber and difficult access result in relatively poor hunter success. A different situation exists on Raspberry Island where heavy harvests of the accessible herd necessitated a closure to hunting in 1968. Poaching is suspected to be primary factor controlling the growth of the Raspberry Island herd since that time.

Non-resident hunters presently account for roughly half of the recorded harvest. A few elk are taken incidental to deer and bear hunting. More than half the harvest usually is taken during September and October when access by floatplane and small boat is possible. After mid-November, hunters utilize commercial fishing boats to hunt coastal areas with limited success.

Potential losses of elk winter habitat to logging are an important consideration in the management of sustained elk populations. The most valuable stands of commercial timber grow along the coast, many of which are critical winter habitat for elk. Depletion of willow and elderberry stands, invasion of spruce into grass-shrubland communities, and growing competition for forage from an increasing deer population make maintenance and enhancement of existing elk winter ranges increasingly important. While clearcut logging results in temporary increases in growth of seral forbs and browse species, much of such vegetation is unavailable under winter snows. In addition, elk generally utilize the edges of clearcuts most heavily and large clearcuts are of little benefit. Thorough assessment of vegetation succession and elk use of clearcuts following initial logging activity will be necessary in developing alternative cutting methods which will produce favorable elk habitat in logged areas while maintaining economically efficient logging operations.

Illegal kills of elk have retarded desirable growth in the accessible Raspberry island elk herd. While development of an extensive logging road system on Afognak Island will improve distribution of hunters and facilitate attaining desirable harvests on some elk herds, increased poaching can be expected. Enforcement of hunting regulations will require greater emphasis as access to elk improve.

Unit 8 - 1974 Elk Harvest Statistics from Hunter Reports

	<u>NO.</u>	<u>PERCENT</u>
Permits issued	776	-
Permits returned	328	42%
Reporting permittees who hunted	118	36%
Successful hunters	30	25%
Mean days per elk	16.6	-
Total days afield	498	-
Male harvest	16	53%
Female harvest	14	47%
Total reported harvest	30	100%

PREPARED BY: Roger B. Smith
Game Biologist III
March 19, 1974

Afognak Elk Harvest, 1950 - 1975

Year	Harvest	No. Of Hunters	Percent Success
1950	27	50	54
1951	0	0	0
1952	15	35	43
1953	19	40	46
1954	0	0	0
1955	26	105	25
1956	40	135	27
1957	70	250	28
1958	110	345	32
1959	120	330	36
1960	127	345	37
1961	120	260	46
1962	110	186	59
1963	100	175	55
1964	60	105	57
1965	142	309	46
1966	116	181	51
1967	102	242	42
1968	72	158	45
1969	68	187	36
1970	62	184	34
1971	27	190	15
1972	18	112	16
1973	18	116	16
1974	30	118	36
1975	23	121	19

SELECTED REFERENCES

- Alaska Department of Fish and Game. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 143 pp. + 563 maps.
- Alaska Department of Fish and Game. 1975. A fish and wildlife resource inventory of the Northeast Gulf of Alaska. Vol. I and II (411 pp., 757 pp. + 128 maps).
- Alexander, J.E. 1970. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-2.
- _____ 1971. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____ 1973. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- Anderson, J.P. 1959. Flora of Alaska and Adjacent Parts of Canada. Iowa State Univ. Press.
- Batchelor, R.F.. 1963. Evidence of Yearling Pregnancies in the Roosevelt Elk. J. Mamm., 44(1):111-112.
- _____ 1963. Elk Distribution, Abundance and Composition Surveys, Afognak Island, Alaska. P-R Report W-6-R-3, 3(D-1a).
- _____ 1963. Elk Range Studies - Afognak Island, Alaska. W-6-R-3, 19 (D-1b).
- Murie, O.J. 1951. The Elk of North America. The Stackpole Co., 376 pp.
- Nelson, U.C. 1949. Investigations to Determine Elk Populations on Afognak Island and Recommendations for their Management. Unpub. P-R Rept., 3-4, 8 pp.
- Sheets, A. 1949. Elk Herd Distribution, Abundance and Composition Studies, Alaska W-6-R-1, 264 (D-1a).
- Smith, R.B. 1974. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- _____ 1976. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-7.
- Troyer, W.A. 1960. The Roosevelt Elk on Afognak Island, Alaska. J. Wildl. Mgmt. 24(1):15-21.

MOUNTAIN GOAT

The mountain goat (Oreamnos americanus) is the single North American representative of a widespread group of goat-antelopes. They are one of the two species of all-white hooved large mammals found in Alaska. They are often confused with young and female Dall sheep, but may be distinguished by their longer hair, deeper chest, and black horns. The white pelage of the goat is made up of an underwool interwoven with coarse guard hairs. There is a crest of long, erect hair up to six or more inches in length along the spine, on the rump and over the shoulders and neck. Long hair on the feet gives the animal the appearance of wearing pantaloons. A shaggy crop of hair hangs from the chin and lower jaw. The pelage which is longer in winter than summer is shed each spring. Shedding is usually completed by mid-August with the new coat remaining relatively short until mid-fall.

The appearance of both sexes is alike except that males are about 10 to 12 percent larger than females. Both sexes have horns, however they differ somewhat in appearance. The horns of females are slender with a gradual taper and curve while those of males have a larger base, more rapid taper and a more abrupt curve in the central portion.

Horn growth begins during the first summer following birth and continues uninterrupted until the animal is approximately a year and half old. At this time the horns are five to six inches long.

In Alaska, goats occur from the southernmost tip of Southeast Alaska, north along the coast to Cook Inlet. With the exceptions of Bainbridge Island and possibly Culross Island in Prince William Sound, goats do not occur naturally on any of the coastal islands. The northern limit of their range extends into the Talkeetna Mountains nearly to McKinley Park and into the southern drainages of the Wrangell

Mountains. Goats have been transplanted to Kodiak, Chichagof, and Baranof Islands where they have established breeding populations.

Mountain goats usually mate in November and December. Males may wander considerable distances in search of receptive females. They do not collect harems, but some battling does occur. Except during the rut, adult males are segregated from other age classes and often are seen in pairs. Females with kids and immature animals are generally found in groups. In unhunted areas, females, kids and young goats sometimes congregate in herds of 70-100 or more.

It is not known if yearling males are capable of breeding. They do accompany older males during the rut. Evidence indicates that yearling females do breed, and may bear their first young at about two years of age.

A single kid is born in late May and early June after a gestation period of approximately 180 days. Twinning is not common. Kids are very precocious and can keep up with adults when only hours old. After the birth of the kids, females with newborns will join together and form nursery flocks. Kids usually remain with their mothers until the next breeding season. Because females with yearling kids are often seen in late spring, it is suspected that goats may not breed every year. Mountain goats may live 14 to 15 years.

Mountain goats are both grazing and browsing animals, depending on the particular habitat and season of the year. They normally summer in high alpine meadows where they graze on grasses, herbs and ground-growing shrubs. As winter advances and the more succulent species are frost-killed, the feeding habits shift to browsing. Most goats migrate from alpine summer ranges to winter at or below tree line but some may remain on windswept ridges. On many goat ranges in Alaska animals can be observed year round on the same ridge tops.

Accidental death is the most common form of natural mortality in Alaska. Snowslides are frequent in the range of the goat. Falls apparently account for the death of some goats. Many goats show healed wounds, missing teeth, and broken horns indicating a high incident of falls. Severe winters also have a detrimental effect on goat.

Wolves and coyotes are apparently serious predators on goats under certain conditions. Most mountain goat range is rugged enough to offer security from wolves and other mammalian predators. Goats are apparently most susceptible to predation in winter when snows are deep and in the spring during and following kidding. Wolvernies, lynx and eagles, like wolves and coyotes, will prey on the mountain goats under severe conditions when smaller prey is scarce.

Because goats inhabit the more inaccessible mountain areas, man's exploitation of the land through mining and timber harvest has had insignificant effect on goat populations.

MOUNTAIN GOAT - UNIT 8 (KODIAK - AFOGNAK)

Mountain goats were first introduced to Kodiak Island by the United States Fish and Wildlife Service during 1952 and 1953. The transplanted stock, consisting of 7 males and 11 females from the Seward and Kenai Peninsula regions, were all released in Hidden Basin of Ugak Bay, Kodiak Island.

Typical of the mountain goat species, the population has displayed a relatively slow increase and today is estimated from 130 to 200 animals (R. Smith, Area Biologist, A.D.F.&G., Kodiak, pers. comm.). There are no records of mountain goats ever having exceeded the carrying capacity of their range (Hjeljord, 1971) and it is suggested that this population is perhaps near static on its present range (R. Smith, pers. comm.).

Most of the population centers in the Crown Mountain region north of Hidden Basin, however; their range has dramatically expanded to the south. They have recently been observed as far south as Old Harbor.

The most stressful period on the goat population is when winter and spring snows cover available food. According to studies by O. Hjeljord (1971), the goats on Kodiak use an extremely restricted area during the winter. Some movement between one feeding site and another takes place, but to a great extent goats appear to stay in the same area for prolonged times.

Providing graphic example of the effects of snowfall on movements, Hjeljord's observations covered the winters of 1968 and 1969.

"Throughout virtually the whole winter of 1968-1969, there was a permanent snow cover from sea level to the mountain tops. In March, the snow depth below the alderline averaged two-three feet in the Hidden Basin area. At this time, the goats were found almost entirely above timberline, at altitudes varying from 1,000 to 2,500 feet. They were feeding on wind-blown slopes and ridges and on south-facing rock outcrops (i.e. - the alpine habitat)."

"During the winter of 1969-1970 conditions were entirely different. At lower altitudes most the precipitation fell as rain or sleet. Throughout most of the winter there was no permanent snow cover below 300 to 800 feet on Kodiak, depending on the exposure. Also, for several hundred feet above this altitude the ground was partly free of snow.

During February-March 1970, more than 90% of the goat population occurred on subalpine habitat, feeding on alder-covered slopes generally adjacent to ravines coming down from the high country."

During particularly severe winters, goats have been observed on the beach (R. Smith, pers. comm.).

In late April or early May, depending on the snow, the principal goat ranges are on the lower alder slopes. These ranges are identical in location with the subalpine winter habitats, but as the season progresses the animals become more dispersed and show an increasing tendency toward upward migration. Throughout this early spring period, foraging on the lower slopes changes gradually from primarily fern rhizomes and browse of winter to the new growth of grasses, ferns and other herbs (Hjeljord, 1971).

" In mid-May, when there is relatively lush and abundant growth on the lower alder slopes, growth of new vegetation on the high wind-blown ridges and rock outcrops has not yet started. Still the goats are spotted in increasing numbers above timberline by this time. They travel extensively, along barren ridges as well as over large continuous snow fields. As the vegetation on the alpine habitat appears poor both in quality and quantity at this time of year, this early migration appears to be more the result of their affinity for the high, rough terrain rather than a search for better forage. As a rule, goats do not remain at high elevations during these early days of spring but return frequently to the habitats at lower altitude.

The permanent shift to the alpine summer habitat takes place towards the end of May and in the early part of June. By this time, the larger part of the summer range is still covered with snow, and only ridges and south-facing rock outcrops can offer the goats a limited amount of new vegetation (Hjeljord, 1971).

Extensive movements are usually noted on the summer range with the goats rarely grazing intensively at one place for any length of time. Along ridges, distinct paths are formed leading to feeding sites. Although typically, the terrain is steep and broken, the feeding sites

are generally located on relatively gentle slopes. The high occurrence of goats on south-facing slopes is probably the result of more favorable conditions for plant growth there. On Kodiak , the goats display a preference for feeding on the sedge (Carex sp.) meadow and Erigeron slope habitats.

" This lush vegetation is particularly common in south-facing bowls on Crown Mountain, and due to late snow melt in these bowls, portions of the vegetation will be in an early state of growth even in late summer. According to Fish and Game biologist Bernhard Ballenger, a large part of the goat population is found here during summer (pers. comm.). On the annual aerial goat survey in August 1970, Mr. Ballenger spotted 49 goats in one such bowl." (Hjeljord, 1971)

Sport harvest on this species began in 1968 under a tightly regulated hunt. Current management regulations allow the taking of 15 goats by permit only. The harvest has been traditionally localized in the Crown Mountain vicinity accessible from Hidden Basin.

The sex ratio of historic harvest data reflects an imbalanced overharvest of females. This tends to imply an "opportunistic" rather than a trophy hunt, however; at the current harvest level this imbalance is probably not limiting the population (R. Smith, pers. comm.).

Subsistence effort on this introduced species is non-existent. The relative concentration of goats in the Hidden Basin and Terror Lake areas are considered as future potential non-consumptive use areas. Mountain goats hold a rather high aesthetic value to the islanders, possibly due to its status as a recent transplant and its relative rarity.

Future impacts may arise from the planned hydroelectric development of Terror Lake and its accompanying roadways providing increased accessibility to the interior region.

UNIT 8 - MOUNTAIN GOAT HARVEST STATISTICS, 1968-1974

Date	Season Dates	Number Permits Issued	Number Hunters Afield	Percent Hunter Success	Number Goats Harvested	Conditions of the Hunt
1968	Sept. 1-30	10*	9	67%	6(3M, 3F)	10 goats by permit; public drawing
1969	Sept. 1-30	10*	11	55%	6(5M, 1F)	10 goats by permit; public drawing
1970	Sept. 1-30	15	8	63%	5(4F, 1UKN)	15 goats by permit; public drawing
1971	Sept. 1 - Oct. 30	25	8	50%	4(1M, 3F)	15 goats by permit; public drawing
1972	Sept. 1 - Oct. 30	40	21	48%	10(3M, 4F, 3UKN)	15 goats by permit; To be closed by field announcement
1973	Sept. 1 - Oct. 30	32	26	58%	15(7M, 8F)	15 goats by permit; To be closed by field announcement
1974	Sept. 1 - Oct. 30	58	28	57%	16(5M, 10F, 1UKN)	15 goats by permit; To be closed by field announcement

* Five additional alternate permits issued.

UNIT 8 - MOUNTAIN GOAT HARVEST STATISTICS, 1974*

	No.	Percent
Permits issued	58	100%
Permits holders reporting	55	95%
Reporting permit holders who hunted	28	51%
Successful hunters	16	57%
Mean days hunted per successful hunter	2.5	--
Males harvested	5	31%
Females harvested	10	63%
Unknown sex harvested	1	6%
Total harvest	16	100%
Mean no. goats sighted by hunters	23.2	--

* From hunter interviews

Unit 8 - Mountain Goat Sex and Age Composition Counts, 1952-1974

Date	Adult (may include sub-adults)	Kid	Total	Kid/100 Adult	% Kids in Total Count	Observer	Flight Time (Hrs)
1952-1953	7 males and 11 females, total 18 animals transplanted to Crown Mountain.						
1954			Zero Data				
1955			Zero Data				
1956	-	-	5			Unsigned, undated report.	
1957	2	2	4	100.0	50.0	"	
1958	4	2	6	50.0	33.3	"	
9-19-1959	5	2	7	40.0	28.6	Will Troyer	--
1960			Zero Data				
1961			Zero Data				
1962	14	8	22	57.1	36.3	Will Troyer	--
1963	18	8	26	44.4	30.7	Will Troyer	--
1964	13	13	26	100.0	50.0	Will Troyer	--
1965	22	13	35	59.0	37.1	Will Troyer	--
9-20-1966	38	16	54	42.1	29.6	B. Ballenger	--
9-05-1967	39	19	58	48.8	32.7	B. Ballenger	--
12-20-1968	57	14	71	24.5	19.7	B. Ballenger	2.2
8-05-1969	73	15	88	20.5	17.0	B. Ballenger	2.4
8-22-1970	61	20	81*	32.7	24.7	B. Ballenger	--
1971			Zero Data*				
7-27-1972	64	27	91	42.1	29.7	B. Ballenger	2.3
9-18-1973	88	24	112	27.3	21.4	R. B. Smith	1.9
8-18/19-1974	37	12	49	32.4	24.5	R. B. Smith	5.3

*"Much snow cover on high elevations, goats hard to spot."--B. Ballenger.

PREPARED BY: Roger B. Smith, Game Biologist III
May 28, 1975

MOUNTAIN GOATS - UNIT 15 (KENAI)

Knowledge of goats in the coastal region of Game Management Unit 15C is relatively unknown. Goats utilize the fingers of land extending into the ocean and in winter they utilize the timbered fringe areas to beach line (Paul LeRoux, A.D.F.&G., Soldotna, pers. comm.).

Little is known about the goat harvest in these areas. It is known that some areas are being hunted by resident hunters. Very few goats are taken from Gore Point to Bear glacier. Some hunting occurs in the Port Dick areas (Paul LeRoux, pers. comm.).

Prior to any timber sales in the Kenai Mountains the area should be studied to determine if it is used by goats in the winter and is critical to their existence.

MOUNTAIN GOAT - GMU 15 - WESTERN KENAI PENINSULA

Goat harvest and hunting pressure by Subunit for 1969, 1972, 1973 and 1974, GMU 15.

Year	15 (A)			15 (B)			15 (C)			Unit 15 Total		Number of Hunters	Percent Success
	MM	FF	All	MM	FF	All	MM	FF	All	MM	FF		
1969	*	*	*	*	*	*	*	*	*	31	38	69	*
1972	0	0	0	11	5	16	41	38	79	52	44	160 ^{1/}	50.0
1973	0	0	0	10	7	17	32	23	56	46	31	144 ^{2/}	45.8
1974	0	0	0	3	5	9	47	35	83	56	41	222	44.6

* Data not available.

1/ 16 hunters reported taking two goats each.

2/ 12 hunters reported taking two goats each.

3/ Includes animals of unknown sex.

PREPARED BY: Paul A. LeRoux, Game Biologist III

SELECTED REFERENCES

- Alaska Department of Fish and Game. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 143 pp. + 563 maps.
- Alaska Department of Fish and Game. 1975. A fish and wildlife resource inventory of the Northeast Gulf of Alaska. Vol. I and II (411 pp., 757 pp. + 128 maps).
- Alexander, J.E. 1971. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____. 1973. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- Ballard, W. 1975. Mountain goat survey technique evaluation. Alaska Dept. of Fish and Game. Fed. Aid Proj. No. W-17-7.
- Burt, W.H. and R.P. Grossenheider. 1952. A field guide to the mammals. Houghton Mifflin Co., Boston. 284 pp.
- Geist, V. 1962. Observations on the habitat-directed behavior of Stones Sheep (Ovis dalli stonei) and the Mountain Goat (Oreamnos montanus). Thirteenth Alaska Science Conf. Proc: 29-30.
- Hall, R.E. and K.R. Kelson. 1959. The mammals of North America. Roland Press. New York. Vol. I and II. 1,083 pp.
- Hjeljord, O. 1970. Feeding ecology and habitat preference of mountain goat in Alaska. Alaska Coop. Wildlife Unit. No. 22. U. of Alaska.
- _____. 1973. Mountain goat forage and habitat preference in Alaska. J. Wildl. Manage. 37(3):353-362.
- Johnson, L.J. 1970. The mountain goat in Alaska. Alaska Dept. of Fish and Game. Wild. Notebook Series. 2 pp.
- Klein, D.R. 1952. A reconnaissance study of the mountain goat in Alaska. M.S. Thesis. U. of Alaska. 121 pp.
- LeRoux, P.A. 1973. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- _____. 1975. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- _____. 1976. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-7.
- Manville, R.H. and S.P. Young. 1965. Distribution of Alaskan mammals. U.S. Fish and Wildlife Ser. Cir. 211. 74 pp.

Merriam, H. 1960. Goat distribution and population status. Alaska Dept. of Fish and Game. Fed. Aid Proj. No. W-6-R-1. Report No. E-3.

Smith, R.B. 1975. Annual report of survey-inventory activities. Game Management Unit 8. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.

_____ 1976. Annual report of survey-inventory activities. Game Management Unit 8, Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-7.

Walker, E.P. et al. 1964. Mammals of the world. John's Hopkings Press. Baltimore. Vol. I and II. 1,500 pp.

MOOSE

The moose (Alces alces) is the largest member of the deer family in the world; and the Alaska form (Alces alces gigas) is the largest of all subspecies.

Adult males in prime condition that have been weighed indicate that 1,000-1,6000 pounds is the usual range; females weigh 800-1,200 pounds. Only bulls have antlers. The largest moose antlers in North America come from Alaska. In Alaska, trophy class bulls are found throughout the state, but the largest come from the Alaska Peninsula, lower Sisitna Valley and Kenai Peninsula. Moose produce trophy-size antlers when they are six or seven years old and may continue to produce large antlers until they are 13 or 14. In the wild, moose may live more than 20 years.

Moose are long legged, short bodied, have a drooping nose, a "bell" or dewlap under the chin, and no apparent tail. They are colored a variety of brindle browns, shading from pale yellow to almost black, depending upon the season and the age of the animal. The hair of newborn calves is generally an orange-brown that fades to a lighter rust color within a few weeks. Newborn calves weigh 28-35 pounds and grow to over 300 pounds within five months.

Moose have adapted well to man's incursions and where they have been given protection from excessive exploitation, they and man have co-existed in close association. In Alaska, they occur in suitable habitat from the Stikine River in the Panhandle to the Colville River on the Arctic Slope. Moose are most abundant in second growth birch forests, timberline plateaus and along the major rivers of southcentral and interior Alaska.

Moose are generally sedentary animals, but seasonal movements associated with breeding, parturition and treks to favored forage areas may cover 20-40 miles. A tagged moose is known to have moved 60 miles.

In mountainous areas, bulls spend most of the summer and early fall at or above timberline, while cows with calves prefer more dense cover at lower elevations. Cows move toward timberline during the rut and the bulls meet them about halfway. The sexes separate after the breeding season; and groups of 10-20 bulls at or above timberline are common.

Both sexes are sexually mature at 16 months on the best ranges. Breeding begins in late August when the larger bulls shed their antler velvet and begin pre-rut behavior. This includes antler polishing, a cessation of feeding activities, jousting with similar-sized males, calling and seeking receptive females. Males exhaust the entire reserve of fat accumulated during the summer months during the rut. This may include 20-25% of their total weight, and they enter the winter exhausted. Most breeding takes place from September 15 to October 10, with most females conceiving during the first estrus cycle. Calves are born in late May and early June after a gestation period of approximately 240 days.

About 90% of the females over two years old breed every year. Cows generally produce a single calf the first time they breed, but thereafter up to 60% produce twins depending upon the quality and quantity of available food. Triplets occur rarely, perhaps once every 1,200-2,000 births. Most calves are born in swampy muskeg areas. A cow moose will defend her newborn calf vigorously.

The reddish-brown calves weigh 25-35 pounds at birth. Thereafter, they grow at a fast rate, reaching 300-400 pounds four months later. A little milk plus vast quantities of willow leaves, sedges, pond weeds and a sampling of most everything green except spruce trees produces

animal tissue at a prodigious rate. Calves are weaned in the following fall about the time the mother reenters estrous.

Newborn calves may represent 40-50 percent of a moose population in the spring, but mortality is great, and by November their number often has been reduced by half. Many calves die during the six weeks following birth. Mortality factors include predators, malnutrition and abandonment.

Unlike species dependent upon pristine wilderness or climax vegetation, moose are adaptable to many situations. They thrive on transitional vegetation such as that which follows forest fires, clear-cut logging operations, land clearing for agricultural purposes, highway right-of-way clearing, receding glaciers and braided river beds. Their annual habitat requirements are broad but include the following: breeding grounds, winter feeding areas, calving grounds and summer feeding areas.

During fall and winter, moose consume great quantities of willow, birch and aspen during fall and winter. They may establish a hedge or browse line six to eight feet above the ground by clipping all the terminal shoots of favored food species. When food supplies become critical, moose may eat food that have little nutritional value. The young terminal tips and bud ends and leaves contain most of the nutrients. But when shortages exist, moose will consume the older two-year growth. Occasionally, they will even resort to feeding on some three-year old growth. Since there is little food value in this material, the survival chances of the animals may be lowered.

Spring is the time for grazing, and moose utilize a variety of foodstuffs, particularly sedges, equisetum (horsetail), pond weeds and grasses. In some areas they feed on vegetation in shallow ponds all summer; in other situations forbs, and leaves of birch, willow, alder and aspen are the main summer diet.

Wolves may take a considerable number of calf moose in late May and June. Locally, wolves may be important depressants on moose populations. Since there is total overlap of the distribution of wolves and moose, wolves must be considered major users of the moose resource. Black bears and brown bears both eat moose calves but their impact upon populations has never been thoroughly evaluated.

The winter period is crucial not only to the survival of adults and young of the year, but also to the survival of the following year's calves through abortion of fetus or resorption by the cow. Winter food shortages result in malnutrition and may cause losses to the population. Some losses may not be directly caused by the malnutrition but result from diseases or parasites that attack undernourished moose.

Internal parasites that affect moose include liver flukes, tapeworms and other roundworms, stomach flukes and lungworms. The winter or moose tick, is the only external parasite that is a serious health hazard to moose. Other diseases reported in moose include blindness, Bang's disease, tuberculosis, arthritis and necrotic stomatitis.

Automobile collisions kill some moose, especially in winter when moose refuse to leave the easy travelled route of a snow-plowed highway. Moose also prefer to move along plowed railroad right-of-ways rather than flounder through deep snowdrifts. During winters with exceptionally deep snow, as many as 200 moose have been killed by the Alaska Railroad.

Moose may move into residential areas and occupy yards, gardens and similar sheltered areas during severe winters. They often become such nuisances that they have to be destroyed.

MOOSE - UNIT 9 (ALASKA PENINSULA)

Although moose are generally considered relative newcomers to the Alaska Peninsula, early reports show they were present as far west as Bear Lake near Port Moller in the late 1800's. Probably they were eliminated periodically from major portions of the peninsula by cataclysmic volcanic eruptions. As conditions stabilized and vegetation became reestablished, moose reappeared, giving rise to a theory of westward movement in recent years.

The populations between Iliamna and Mother Goose Lakes apparently built up rapidly from the late 1940's through the mid-1950's. The population increase below Mother Goose Lake continued into the early 1960's.

The greatest densities of moose occur along rivers and their headwaters from King Salmon River to and including the Meshik River. Sex and age composition counts of selected areas have included over 2,000 animals in past years although a current estimate places the total population at approximately 3,500 moose (Jim Faro, Area Biologist, A.D.F.&G., King Salmon, pers. comm.). Generally throughout the peninsula, moose densities are low and either stable or declining depending on specific subpopulations. The low densities are due either to poor reproductive success or to habitat adaptation following a population peak (circa 1960).

Along the Pacific coastal drainages, moose populations are very low, but apparently stable. A few animals are observed in the bay areas during summer and fall but then are suspected to migrate across the mountains to winter in the western lowlands.

Jim Faro (pers. comm.) reports seeing moose tracks in May leading

back to the Pacific drainages.

Considering the low population and the present lack of observable cause for migrating, no critical habitat is defined for the Pacific coastal moose.

Human uses of moose include trophy hunting, largely by guides and non-residents, and recreational meat hunting by residents. This unit produces what may be the world's largest representatives of the species, but few weights and measurements are available at this time. Some of the largest recorded moose antlers have come from Unit 9.

The absence of active villages combined with low moose populations along the Pacific coast implies that "subsistence" efforts are virtually nil there. In the 1974 season out of the 705 moose harvested throughout the total unit, only 21 (3.0%) were reported harvested in the Pacific drainages.

Throughout the unit, Alaskan residents usually account for roughly 50% of the harvest with majority of the animals taken before November 1. From the 1974 coastal harvest, residents reported taking 14 moose; non-residents 7.

Future impacts are anticipated as the result of development of Native Land Claims Selections. Encroachments depleting browse and increased hunting access to remote areas have historically reduced populations and ranges. Throughout the Alaska Peninsula, established moose populations in the vicinity of villages are now non-existent.

MOOSE - UNIT 9 - ALASKA PENINSULA

Harvest and Hunting Pressure

<u>Year</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unid.</u>	<u>Total</u>	<u>Hunters</u>	<u>Percent Success</u>	<u>% Non-Resident</u>
1964	185	64	0	249	--	--	
1965	213	68	4	285	--	--	
1966	240	75	8	323	519	62.2	
1967	301	68	9	378	509	74.3	
1968	366	72	5	443	583	76.0	
1969	317	70	6	393	527	74.6	47.6
1970	266	84	2	352	457	77.0	
1971	317	116	7	440	591	74.5	41.4
1972	454	91	11	556	773	71.9	50.7
1973	607	206	26	839	1,175	71.4	36.0
1974	520	167	18	705	1,072	65.8	43.2
1975 ^{1/}							

1) Compilation of returns in progress.

MOOSE - UNIT 9 - ALASKA PENINSULA

HUNTER SUCCESS

Year	Resident	%	Non-Resident	%	Unknown	%	Total Harvest
1969	212	53.7	167	42.3	16	4.1	395
1970	151	42.9	73	20.7	128	36.4	352
1971	244	55.5	182	41.4	14	3.2	440
1972	232	41.7	282	50.7	42	7.6	556
1973*	469	55.9	314	37.4	56	6.7	839
1974	347	49.4	332	47.0	26	3.6	705
Total	1,665	50.3	1,350	41.1	282	8.6	3,287

* Total known moose harvest..... 839
 * Harvest shown on IBM run..... 771

1974		%
Alaska Resident Harvest (non-peninsula).....	257	36.5
Alaska Peninsula Resident and Vicinity Harvest.....	90	12.8
Non-resident Harvest.....	332	47.1
Residency Unknown.....	26	3.7
Total		705

Unit 9 Coastal Harvest by City:

City	Successful Hunters
Anchorage	9
Kenai	1
Seward	2
Soldotna	2
Total	14

MOOSE - UNIT 14 (ANCHORAGE)

Moose are and have been an integral part of this rapidly developing area. Moose populations were benefited considerably by the openings created in mature forests during the first half of the century by construction of the Alaska Railroad, gold mining and colonization of the Matanuska Valley. The openings were created not only by construction activities but by fires started attendant to these activities. Early accounts indicate a scarcity of moose in the lower Susitna and Matanuska Valley. Large numbers of moose began to appear in the mid-1940's.

Large areas burned about 1924 and reburned about 1940, with smaller fires in intervening years. Great quantities of birch, willow and aspen browse appeared where little was present before. Triggered by the sudden abundance of food, the high reproductive capability of moose resulted in a rapid increase in the herd. Moose populations in much of Unit 14 reached historic highs of abundance in the early 1950's. Since then, a gradual reduction of winter range, combined with several unusually severe winters, has caused some reduction in moose numbers in specific areas.

Subunit 14A, the Matanuska Valley, is currently estimated to support a static population of approximately 2,500 moose. During winter, this population is found below 1,000 feet throughout all the drainages particularly along the Knik and Matanuska Rivers. Anticipating continued human development and encroachment on the winter habitat in this region, the areas surrounding the base of the Talkeetna Mountains from Willow to Moose Creek may become critically important to moose in future years. Although this habitat is not considered prime, presently a major portion of it is state owned and could be rehabilitated (J. Didrickson, Area Biologist, A.D.F.&G., Palmer, pers. comm.).

Following the typical seasonal movements of this species, calving occurs throughout the swampy lowlands beginning in late May and extending through June. Some noted areas are Nancy Lake Flats, Palmer-Hay Flats, Knik River Flats and Little Susitna River Flats as well as along the Little Susitna River itself. By late summer, they are returning to the uplands and remain there until heavy snows and lack of available food forces them back towards the lowlands.

Subunit 14C is an area possessing peculiar management problems. This subunit incorporates metropolitan Anchorage, Fort Richardson Army Base, Elmendorf Air Force Base, Chugach State Park, the State Refuge at Potter Marsh and the northern portion of the Chugach National Forest. All the area is used by moose except the highest peaks and ice fields. Inevitably, moose and people clash over the use of roads, airfields, ornamental shrubs, golf courses, school yards and playgrounds. While moose show some tolerance to intensive development, man seems unable to tolerate moose in some situations. Furthermore, as the intensity of human land use increases, moose are limited by the scarcity of food and the lack of areas providing life's necessities. These stages have been reached in many of the areas in the vicinity of Anchorage.

Moose are not excluded or eliminated from the commercial and military airports. Limited access highways are fenced and an ever increasing portion of the area is under concrete or asphalt as urbanization spreads to the north. Moose have persisted in surprising numbers in the remaining lesser developed areas, but not without creating controversy.

In the mid-1950's 2,500 to 3,000 moose were observed wintering in the Eklutna Flats-Eagle River area. Presently, less than 600 moose are estimated to utilize the lowland region from Eklutna Flats to Potter's Marsh. Approximately half of this population

winters on the Fort Richardson-Elmendorf complex, (D. Harkness, Area Biologist, A.D.F.&G., Anchorage, pers. comm.). Efforts by military wildlife management programs to rehabilitate portions of this habitat may serve to slow the decline of this local population.

The recorded harvest from these subunits are primarily sport motivated although the meat is usually retrieved for domestic use. In 1975, non-residents took 13.7% of the harvest in Unit 14.

Reflecting the decline in populations in subunit 14A, harvests have dropped in recent years. In both 1974 and 1975, only 167 moose were taken from this subunit annually. Recorded poaching incidents account for an additional 50 animals yearly.

Harvest from subunit 14C has in recent years fluctuated at low levels finally reaching an all time low in 1975 of 29 moose. This harvest reflects a combination of shortened seasons, and closed areas (e.g. - Fort Richardson) but most significantly, is the result of several factors reducing the populations. Poor overwinter survival of calves, vehicle collision mortalities, poaching and incidental kills exceeded the sport harvest in 1975. A recent increase in auto accident kills most likely reflects the great increase in Anchorage area traffic. The high poaching total illustrates the encroachment of the Anchorage populace into moose wintering areas and consequently the irresistible temptation to "pot" a moose from ones back porch.

Although direct comparison between all known mortality factors and the annual calf production is difficult, it is probably safe to assume that far more animals are leaving the population than entering it. In view of the rapidly growing Anchorage populace, there is little reason to believe that the downward trend will reverse itself (D. Harkness, unpublished data).

Non-consumptive use of this unit's population is high. The Matanuska Hay Flats has been proposed for an educational viewing area. Likewise, the Palmer Hay Flats is renowned for viewing moose between December and April. During summer and fall, moose are frequently encountered in upland forested regions such as Chugach State Park.

A management study is currently in progress on Fort Richardson utilizing visual collars to better understand seasonal movements in this area.

Moose harvest and hunting pressure in Alaska's Game Management Subunit 14A, 1970-1975.

Year	Date	Bulls	Cows	Unid.	Total	No.of Hunters	Percent Success
1970	8/20-9/20	182	0	1	183		
	11/1-11/20	102	0	6	108		
	Unknown Date	79	2	4	85		
Total		363	2	11	376	897	41.9
1971	8/20-9/20	177	0	1	178		
	11/1-11/20	225	0	0	225		
	9/1-9/20						
	Antlerless	0	101	0	101		
	11/1-11/14						
	Antlerless	0	233	0	233		
	Unknown Date	127	145	9	281		
Total		529	479	10	1,018	2,090	28.7
1972	8/20-9/20	83	1	1	85		
	11/1-11/20	100	1	0	101		
	9/1-9/20						
	Antlerless	0	75	0	75		
	Unknown Date	29	17	2	48		
Total		212	94	3	309	No Data	No Data
1973	8/20-9/10	136	0	2	138		
	11/1-11/10	167	0	3	170		
	Unknown Date	34	1	3	38*		
Total		337	1	8	346	1,506	23.0

continued

* This figure includes 4 male moose, 1 female, and 1 moose of unknown sex reportedly taken in October, December, January or February.

(Continued) Moose harvest and hunting pressure in Alaska's Game Management Subunit 14A, 1970-1975.

Year	Date	Bulls	Cows	Unid.	Total	No.of Hunters	Percent Success
1974	8/20-9/20	164	0	3	167		
Total		164	0	3	167	1,225	13.6
1975	9/1-9/20	166	1	0	167	893	18.7

MOOSE HARVEST - UNIT 14C

Year	Bulls	Cows	Unk. Sex	Totals
1965	246	249	2	497
1966	134	77	4	215
1967	55	1	5	61
1968	90	38	0	128
1969	92	14	2	108
1970	65	5	6	76
1971	98	44	1	143
1972	55	36	3	94
1973	93	40	4	137
1974	41	4	1	46
1975	29	0	0	29

Comparison of success among persons hunting bull moose excluding airport and Fort Richardson hunt.

Year	Bull Kill	# Hunters	Percent Success
1969	92	215	42.8
1970	65	181	35.9
1971	93	226	41.2
1972	41	137	29.9
1973	78	388	20.1
1974	41	265	15.5
1975	29	197	14.7

MOOSE UNIT 15 (KENAI)

The Kenai Peninsula includes the Kenai National Moose Range and is almost synonymous with moose. Although moose are long-time residents of the peninsula, population levels have fluctuated over the years with changes in vegetation and the age of the forest canopy. Reflecting these changes in habitat status, the current population has declined dramatically from its peak in the late 1960's.

Since the 1920's, fires (largely caused by man) have had a most beneficial effect upon the numbers of moose in the unit. The most significant event benefiting recent moose populations was the 350,000 acre fire that occurred in 1947. The fire was capricious, skipping some areas entirely while burning to the mineral layer in others, and leaving a patchwork of vegetation over nearly 450,000 acres. Plant succession since has been equally variable and the complex of vegetation types and successional stages provided unparalleled moose habitat that is now past its zenith. Fires continued to bless the area, with approximately 5,000 acres burned on Kenai Lake in 1959, 90,000 acres burned in the Swanson River area in 1969 and 450 acres burned in the Russian River area in 1969. Requiring six to ten years to reach the proper vegetative successional stage, these more recent burns are just beginning to provide prime critical winter moose forage. They are insufficient in acreage however, to compensate for the loss of the 1947 burn area through successional aging.

The U.S. Fish and Wildlife Service has played an active role in modification of winter ranges as a part of long-term management goals on the Kenai National Moose Range. Several thousands of acres have been mechanically reverted from moderate-aged white spruce to willow

and birch in the Skilak Lake area and a considerable portion of the 1969 burn has been "rolled" for aesthetic and browse production purposes. A controlled burning program and pulpwood logging operations should provide additional browse within the refuge.

In spite of these habitat rehabilitation efforts, the population in the northern subunits (15A and B has declined from an estimated 8,000 moose in 1971 to presently 3,500 to 4,500 moose (P. LeRoux, Are Biologist, A.D.F.&G., Soldotna, pers. comm.).

In Subunit 15B, the region along the lower Funny River, the Horsetail Lake area, and benchlands below timberline are important wintering grounds.

Moose habitat off the Kenai National Moose Range has not fared as well. Subunit 15C currently supports a declining population of between 3,000 and 4,000 moose. In the Homer area, where natural and man-caused fires are rare because of the moist climate, the ranges are in poor condition. The older fire-created communities are becoming mature and no new range has been created.

Some climax willow communities at timberline, along streams, on the bluffs and along the beaches from Kenai to south of Ninilchik continue to support sizeable populations of moose, but much of the range shows the effect of overuse. The Ninilchik and Anchor River bottoms in particular appear to be most important in this subunit for providing critical winter forage.

At the eastern edge of Unit 15 where the land is managed by the Chugach National Forest, moose habitat is restricted to steep mountain slopes and river valley. This range is also in poor condition.

In December or January, depending on snowfall and available browse, moose will begin moving into the lowland areas.

Around mid-April, the bulls and females without calves migrate back to the upland and timbered areas. Some animals, however, remain low during the summer and may spend from seven to nine months in the lowlands (P. LeRoux, pers. comm.).

Calving on the Kenai occurs in the lowland areas beginning in late May to early June. At this time the animals are generally dispersed, but densities of 400 to 500 animals may be observed on the Moose River Flats. Likewise, the Chickaloon River Upper Flats may contain 30 to 40 animals.

The primary objective of the harvest appears to be domestic usage of the meat. This objective is closely intermixed with the strong recreational facet, the eastern portion of subunit 15B is being managed to produce trophy bulls.

A shortened season (20 days) prompted by declining populations reduced the harvest to all time lows for all subunits in 1975. The total harvest for the entire unit was 219 moose versus the harvest of 1,419 moose in 1972.

Possessing strong aesthetic values (perhaps psychologically more than visually), moose are common and popular subjects for viewing and photographic purposes.

Most of Unit 15 is under jurisdiction of the Federal Government in the Kenai National Moose Range. The State of Alaska and the Kenai Peninsula Borough own the southern portion of Unit 15. This area includes two state parks, neither of which have much importance to moose. A portion of the state and borough lands will eventually be in private hands, and native corporations may select some refuge land under the Native Claims Settlement Act.

Generally, however, there is stable land tenure on the most important moose habitat.

Here, as elsewhere, roads tend to intersect annual moose migration routes. The Sterling Highway passes through prime winter range and nearly a hundred moose-vehicle collisions may occur annually. Several thousand moose migrate twice annually between the Kenai Mountains and the Moose River lowlands. Any future highways intersecting this region, especially if fenced, would affect perhaps 30% of the moose in Unit 15.

Harvest and Hunting Pressure - Subunit 15(A) (Harvest Ticket Return Data)

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1965	1st	*	0	0	*		
	2nd	*	299	0	*		
	Combined	365	299	0	664	*	*
1966	1st	211	185	0	396		
	2nd	137	0	0	137		
	Combined	382 ¹	185	0	567	*	*
1967	1st	185	0	0	185		
	2nd	62	0	0	62		
	Combined	247	0	0	247	1,036	24
1968	1st	166	1	0	166		
	2nd	91	0	0	91		
	Combined	268	1	0	269	1,092	25
1969	1st	*	*	*	*		
	2nd	*	*	*	*		
	Combined	287	*	7	294		
1970	1st	134	0	3	137	*	*
	2nd	69	0	1	70	*	*
	Antlerless	16	191	3	209	*	*
	Combined	291 ²	191	11	493	918	54
1971	1st	153	223 ²	1	376		
	2nd	141	261 ²	0	402		
	Combined	369 ¹	484 ²	4	853	1,637	52
1972	1st	106	145 ²	1	236		
	2nd	54	0 ²	0	54		
	Combined	193 ²	145 ²	1	339	1,518	22
1973	1st	156	4	2	162	1,427	19
	2nd	82	2	1	85		
	Combined	259 ¹	7 ¹	4 ¹	270		
1974		141	6	5	152	801	19
1975		101	0	0	101	695	15

* Data not available.

1) Total of 1st and 2nd season may be less than for combined season because of inclusion of animals for which date of kill was not given.

2) These data from permit returns. Numbers include both male and female calves.

Moose Harvest and Hunting Pressure - Subunit 15(B) - Soldotna

Year	Bulls	Cows	Unk.Sex	Totals	Number Hunters	Percent Success
1965	183	193	1	377		
1966	119	26	4	149		
1967	69	0	1	70		
1968	108	6	2	116		
1969	119	55 ^{2/}	2	176		
1970	69	75(15BE=50)	2	146		
1971	128	79 ^{1/} (15BE)	5	212		
1972	73	11 ^{1/} (15BE)	1	85		
1973	145 15BE=82 15BW=63	116(15BE)	6	267	877	30
1974	95	1	1	97	313	31
1975 ^{3/}	24	0	0	24	158	16

- 1) Data derived from registration permit returns.
- 2) Data derived from field observations.
- 3) Note: Legal season was not opened.

Moose Harvest and Hunting Pressure - Subunit 15(C) - Homer

Year	Bulls	Cows	Unk. Sex	Total	Hunters	Percent Success
1961	--	106 ^{1/}	--	--	--	--
1962	--	100 ^{1/}	--	--	--	--
1963	349	147	--	496	--	--
1964	470	337	--	807	--	--
1965	263	229	--	492	--	--
1966	278	72	--	350	--	--
1967	294	--	--	294	643	46
1968	404	20	5	429	972	44
1969	420	109 ^{2/}	4	533	--	--
1970	319	68	7	394	775	51
1971	263	146 ^{1/}	4	413	836	49
1972	170	114 ^{1/}	0	284	1,041	27
1973	152	143 ^{1/}	5	300	1,111	27
1974	230	133 ^{1/}	3	366	1,240	30
1975	90	4	0	94	658	15

1) Data derived from permit hunt reports.

2) Data derived from field observations.

MOOSE - UNIT 16 (LOWER SUSITNA)

Subunit 16A is estimated to currently support a near static population of approximately 1,600 moose. Likewise, Subunit 16B has a static population (with possible localized 1260 decreases) numbering between 7,000 and 10,000.

As in other units, the winter habitat is most critical to the survival of moose. Depending upon snowfall and available food, moose will migrate downhill in winter. During this period, they occupy nearly all the drainages below 1,000 feet. In Unit 16, the most wintering important noted are Alexander Creek, the Susitna, Chulitna, Tokositna, Kahiltna, Yenta, Skwentna, Beluga, Chakachatna, Katnu (Big River) and Drift Rivers and some of their tributaries.

Calving occurs in lowland swampy areas beginning in late May and early June. Calving ground locations in this unit are not well identified, but in Subunit 16A calving probably occurs along the Tokositna and Kalhitna River flats and likely in the swampland below Little Peters Hills. In 16B the Susitna Flats, Bachatna Flats, Fox Flats, the swamplands on both sides of Susitna-Belgua Mountain complex and most of the swampland below 1,000 feet in altitude between the Alaska Range and Cook Inlet serve as suitable calving grounds.

Later in the summer, the return trek begins back into the uplands. Here rutting and breeding occur in the fall. In Subunit 16A, a study is in progress utilizing radio tracking and visual collars to follow the seasonal movements of 49 moose (J. Didrickson, Area Biologist, A.D.F.&G., Palmer, pers. comm.).

Unit 16 encompasses most of the primary habitat types preferred by moose including seral willow on the alluvial bars, successional

willow and aspen below receding glaciers, climax willow stands at timberline and seral birch, willow and aspen in fire-created ranges. As the result of the high waters and scouring action of ice at spring breakup, river bottoms receive nearly annually, a regrowth important as moose forage.

Recently, moose have suffered several severe winters in Unit 16 and the available winter habitat was not adequate to sustain the populations. Hundreds died in 1971 and many more in 1972. Creation of additional range through mechanical manipulation or controlled fires is possible if human demands for moose warrant the expense.

This unit receives substantial harvest pressure, primarily from Anchorage area hunters. This is due to its proximity and relative ease of access by aircraft and boat. In 1973, harvest in this unit reached a record high of 925 moose. Eighty percent of this harvest was accomplished through the use of aircraft. The initiation of the regulation banning hunting the same day airborne, reduced the harvest in 1974 to 528 moose. A shortening of the season length in 1975 further reduced the harvest to 242 moose.

The harvest motives are characterized as a recreational hunt for domestic use. Intensive hunter use occurs in the readily accessible areas of Mt. Susitna, Alexander Creek, Beluga Lake, Drift, Chakachatna and McArthur Rivers. Potential non consumptive use exists in these same areas.

Use of this natural resource has not been commensurate with its potential because until the late 1960's access to the area was restricted to aircraft and boats. In 1969, the Sunshine Bridge was opened across

the Susitna River as part of the Anchorage-Fairbanks Highway. This opened a small corner of the unit containing high quality moose habitat and human use of the area increased dramatically.

Most of Unit 16, including all of the high quality moose range, is now owned by the State of Alaska, the Matanuska-Susitna Borough and private individuals. Development in the area will probably be closely tied to the construction of the proposed Knik Causeway which would link Anchorage to the lower Susitna Basin. If this causeway is built, development in Unit 16 will be rapid. Present development plans for the capital relocation, clearcutting and mining in this unit will probably not have much adverse long-term impact other than improved hunter accessibility to the area. With proper regard to moose calving grounds and migration routes, human developments may indeed benefit moose populations by providing additional winter forage as the result of transitional succession of vegetative regrowth.

Moose harvest and hunting pressure in Alaska's Game Management Unit 16,
west side of Cook Inlet, 1969-1975.

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1969	8/20-9/30	252	0	5	257		
	11/1-11/30	183	0	1	184		
	11/21-11/30						
	Antlerless	0	123	0	123		
	Unknown Date	180	44	1	225		
Total		615	167	7	789	1,366	57.8
1970	8/20-9/30	238	0	3	241		
	11/1-11/30	228	0	5	233		
	11/21-11/30						
	Antlerless	0	152	0	152		
	Unknown Date	132	60	7	199		
Total		598	212	15	825	1,442	57.2
1971	8/20-9/30	174	0	0	174		
	Yentna						
	8/20-12/31	9	--	1	10		
	11/1-11/30	249	--	4	253		
	11/21-11/30						
	Antlerless	0	174	2	176		
Total		153	61	8	222		
Total		585	235	16	836	1,648	50.7
1972	8/20-9/30	142	0	1	143		
	Yentna						
	8/20-11/30	11	--	0	11		
	11/1-11/30	236	--	0	236		
	16A - 8/20-9/30						
	Antlerless &						
16B - 8/20-9/30 &	11/1-11/30	0	119	0	119		
	Unknown Date	69	25	4	98		
Total		458	144	5	607	1,413	43.0

continued

(continued) Moose harvest and hunting pressure in Alaska's
Game Management Unit 16, west side of Cook Inlet, 1969-1975.

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1973	8/20-9/20	303	128	10	441		
	Yentna 8/20- 11/30	9	8	0	17		
	16A - 11/1-11/10 & 16B - 11/1-11/20	265	143	5	413		
	Unknown Date	32	18	4	54		
Total		609	297	19	925	1,995	46.4
1974	16A-8/20-9/20 & 16B-8/20-9/30	266	95	6	367		
	16B - 11/0-11/20	49	49	1	99		
	16A-8/20-9/20						
	Antlerless	0	30	0	30		
	Unknown Date	21	11	0	32		
Total		336	185	7	528	1,580	33.4
1975	16A-9/1-9/20	43	0	0	43		
	16B-9/1-9/20 & 11/1-11/10	199	0	2	244		
Total		242	0	2	244	829	29.4

SELECTED REFERENCES

- Alaska Dept. of Fish and Game. 1959. Annual report for 1959. Report No. 11 116 pp.
- _____. 1966. Moose studies. Fed. Aid Proj. Nos. W-6-R-5 and W-6-R-6.
- _____. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 143 pp. + 563 maps.
- Alaska Department of Fish and Game. 1975. A fish and wildlife resource inventory of the Northeast Gulf of Alaska. Vol. I and II (411 pp., 757 pp. + 128 maps).
- Bishop, R. 1969. Moose report. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-15-R-3.
- Bratlie, A. 1966. 1966 moose data. Alaska Dept. of Fish and Game. Typed. Unpub.
- Burris, O.E. and D.E. McKnight. 1973. Game transplants in Alaska. Alaska Dept. of Fish and Game. Game Tech. Bull. No. 4. 57 pp.
- Burt, W.H. and R.P. Grossenheider. 1952. A field guide to the mammals. Houghton Mifflin Co., Boston. 284 pp.
- Faro, J.B. 1970. Annual report of survey-inventory activities. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-2.
- _____. 1971. Annual report of survey-inventory activities. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.
- _____. 1973. Annual report of survey-inventory activities. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.
- _____. 1975. Annual report of survey-inventory activities. Game Management Unit 9. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.
- Franzmann, A.W. and P.D. Arneson. 1973. Moose research center studies. Alaska Dept. of Fish and Game. Fed. Aid Proj. No. W-17-5.
- _____. 1974. Moose research center studies. Alaska Dept. of Fish and Game. Fed. Aid Proj. No. W-17-6.
- _____. et al. 1974. Development and testing of new techniques for moose management. Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-2, 3, 4, 5, 6.
- Hall, R.E. and K.R. Kelson. 1959. The mammals of North America. Roland Press. New York. Vol. I and II. 1,083 pp.

LeResche, R.E. 1970. Moose report. Alaska Dept. of Fish and Game.
Fed. Aid Proj. No. W-17-2.

_____ and J.L. Davis. 1971. Moose research report. Alaska Dept.
of Fish and Game. Fed. Aid Proj. No. W-17-4.

LeRoux, P.A. 1970. Moose survey-inventory progress report. Game mgt.
Unit 15 Alaska Dept. of Fish and Game. Fed. Aid Proj. No. W-17-2.

_____. 1971. Moose survey-inventory progress report. Game mgt.
Unit 15 Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-3.

_____. 1972. Moose survey-inventory progress report. Game mgt.
Unit 15 Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-4.

_____. 1973. Moose survey-inventory progress report. Game mgt.
Unit 15 Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-5.

_____. 1975. Moose survey-inventory progress report. Game mgt.
Unit 15 Alaska Dept. of Fish and Game. Fed. Aid Proj. W-17-6.

Manville, R.H. and S.P. Young. 1965. Distribution of Alaskan mammals.
U.S. Fish and Wildlife Serv. Cir. 211. 74 pp.

Neiland, K.A. 1974. Moose disease report. Alaska Dept. of Fish and Game.
Fed. Aid Proj. No. W-17-4, 5, 6.

Rausch, R.A. 1964. Summary of moose investigations. Alaska Dept. of
Fish and Game. Typed. Unpub. 27 pp.

_____. 1965. Moose status report. Alaska Dept. of Fish and Game.
Type. Unpub.

_____. 1967. Report on 1965-66 Moose studies. Alaska Dept. of
Fish and Game. Fed. Aid Proj. No. W-15-R-1.

_____ and R. Bishop. 1968. Report of 1966-67 moose studies. Alaska
Dept. of Fish and Game. Fed. Aid Proj. No. W-15-R-2 and W-15-R-3.

VanWormer, J. 1972. The world of the moose. J.B. Lippincott Co., New
York. 160 pp.

Walker, E.P. et al. 1964. Mammals of the world. John's Hopkins Press.
Baltimore. Vol. I and II. 1,500 pp.

DALL SHEEP - UNIT 8 (KODIAK - AFOGNAK)

In 1965, 13 dall sheep were released at Uganik Bay on Kodiak Island. The transplant has not faired well. A report in the summer of 1966 indicated that a ram, ewe and newborn lamb had been seen at the headwaters of Barling Bay, approximately 30 miles from the release site.

No other reports on the status of the animals were received until November, 1974. At that time, a band of seven sheep were sighted in Zachar Bay drainage. A single mature ram was observed along with two lambs and four ewes or subadults. The sheep were at approximately 2,400 feet elevation on a southwest exposure with a windswept snow depth of about 10 inches.

No other information is available.

FURBEARERS AND SMALL GAME

Furbearers and small game can be found in the Cook Inlet-Kodiak Island area in varying numbers and in diverse locations. Baseline data, especially population size and composition, on most of the species is almost non-existent. Some indication of relative abundance may be obtained from trapping records, but these are often incomplete or pertain only to specific areas. There is no documented record of the size of the small game harvest. Some data is available on the level of harvest of wolf, wolverine and beaver because these animals must be presented to the Alaska Department of Fish and Game for sealing.

The information for the following species accounts were gleaned from Fish and Game biologists who reside in the area. Most of their information is from personal experience or from hunters and trappers they have contacted. With the exception of a grouse project* conducted some years ago, no research is presently being conducted on small game or furbearers in this area.

The Kodiak Island group produces a variety of furbearers, but because of the relatively warm maritime climate these furs do not become as prime as furs from more northern areas. Consequently, Kodiak furs do not command top prices on the commercial fur market. Some recreational trapping occurs in the vicinity of the city of Kodiak, but the bulk of the fur catch is produced by a few individuals who trap primarily to supplement their income. Since

* Ellison, L.N. and R.B. Weeden, 1968. Game bird report. Fed. Aid. Wild. Rest. Proj. W-13-R-2 and 3. Work Plan B.

there are so few serious trappers, a large portion of the Kodiak Island group is not trapped at all. As a traditional native subsistence effort, trapping has little or no historic background in this area.

The portion of Game Management Unit 9 bordering Cook Inlet and Shelikof Straits is virtually uninhabited. This area is so rugged and remote that few individuals visit to engage in trapping or small game hunting. The few people who do visit, normally fly across Cook Inlet from Homer or Kenai. The magnitude of this effort is unknown.

The Kenai Peninsula is not a large fur producing area. Most of Game Management Unit 15 does not contain good furbearer habitat and thus populations of these animals do not reach high numbers. Some recreational trapping occurs near the cities and along the road systems. Hares are hunted and trapped for subsistence use. There is no non-consumptive use of furbearers except for the viewing of beaver in the Portage area and red squirrels in the various campgrounds.

Except for localized instances, little information is available on furbearers and small game in the Susitna and Matanuska Valleys of upper Cook Inlet. The delineation of habitat types and distribution of species is not possible with the scope of our present knowledge. Only for wolf, wolverine and beaver is the relative importance of the fur harvest known. Some non-consumptive use occurs through effort to photograph and view small game and furbearers.

The greatest danger of furbearers and small game is the loss of critical habitat that may affect one or more species. The relationship of small game and furbearers to each other is a close one. The presence of all species of small game is essential for the presence of furbearers. As furbearers are of commercial value to man, then so, too, are the small game species they feed upon.

BEAVER

The beaver (Castor canadensis) is the second largest rodent in the world. It is a semi-aquatic mammal about 48 inches in length with an average weight of 40 to 60 pounds.

Beavers are monogamous and will usually retain a lifelong association with its mate. Adult beavers breed in January and February. The gestation period is 115 to 120 days. The young are born in April or May. Beavers have one litter a year with an average of four kits per litter. Litter size ranges from two to seven kits. They reach sexual maturity at two years and have a life expectancy of about 12 years.

Beavers are herbivores. During spring their food is mainly grasses, ferns, roots, some tree bark and a variety of water plants. During summer and fall they consume the bark of birch, willow, alder, poplar and ash. Aspens are the most favored beaver food and contain the most nutrients.

As fall approaches, beavers construct a lodge and collect a food supply for the winter. The lodges are constructed in northern or northwestern edges of ponds to get the greatest amount of sunlight during the winter. Clean freshwater and a good food supply are essential to the well-being of beavers.

Beavers are exposed to greatest danger when they leave the water to forage for food. Wolves, coyotes, lynx, wolverine and bears may prey on beaver. In addition to the larger predators, kits are subject to predation by foxes, marten, otters and eagles.

Kodiak Island Group

Alaska's first recorded beaver transplant occurred in 1925 when 24 beavers were released on Kodiak Island. Seven beavers were liberated at Clark's Lake and 17 were released in the streams entering Kalsin Bay (ADF&G, 1973).

Since the transplant, beavers have occupied all of the available habitat. Population numbers are medium to low on Kodiak and low on Afognak. Long winters appear to have an effect on population numbers. Beavers have been overtrapped along the Kodiak road systems. Their importance as a commercial furbearer is minor when compared to the rest of Alaska.

Beavers are considered a nuisance because they dam streams. However, people do like to see and photograph them. Some bartering of furs is done in Kodiak. Prices range up to \$30.00 (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Beaver are abundant within this area. Trapping pressure is by local residents and varies from light to non-existent. Trapping has no significant effect on the beaver population.

Development of oil and minerals in this area may have an adverse impact on beaver habitat and increased human populations will result in higher recreational trapping pressure (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Beaver occur in moderate numbers throughout suitable habitat, especially in the lowland lakes. They are abundant on Kalgin Island where they are occasionally trapped. There are some drainages that

provide good beaver habitat that have no beaver in them today. One of these is the Resurrection Creek system. Beaver could be transplanted there, but with expanding populations, they may repopulate naturally.

A few beaver trappers use airplanes, but most operate off of the road systems either by foot or snow machines. Trappers are encouraged to take beaver along the road systems because of difficulties in keeping road culverts open.

Historically beaver numbers were much higher than they are today. The 1964 earthquake caused a drastic reduction in numbers. The reason for this is unknown (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Beaver are found throughout this area. They occur in greatest numbers in the rivers and streams of the Susitna Valley between the Alaska Range and the Talkeetna Mountains and along the west side of Cook Inlet.

In GMU 14 from 1969 to 1973, the known beaver harvest has ranged from 23 to 220, with an average of 130.8 taken per year. In GMU 16 from 1969 to 1973, the harvest has ranged from 279 to 975, with an average of 584.0 per year. About 95% of the beaver harvest is for commercial sale.

In the area between the Susitna and Matanuska Rivers, the proliferation of subdivisions and summer homes on lakes and streams and roads through beaver habitat result in conflict with beaver populations. When these conflicts occur, beaver are ultimately removed from the areas (Jack Didrickson, Area Biologist, ADF&G., Palmer, pers. comm.).

Beaver affidavit analysis, 1969-1973.

Game Mgmt. Unit	Year	Limit	Percent		Kits and Yearlings (Under 59")	Percent Adults (Over 59")	Total No. of Beaver	No. of Trappers	Avg. No. Beaver/ Trapper
			Percent Kits (Under 54")	Percent Kits and Yearlings (Under 59")					
8	1969	No limit	28.5	40.7	59.7	175	12	14.5	
	1970	No limit	31.3	49.3	50.7	351	24	14.6	
	1971	No limit	36.5	55.4	44.7	85	8	10.6	
	1972	No limit	32.0	40.0	60.0	52	6	8.7	
	1973	No limit	24.3	43.4	56.6	115	9	12.8	
9	1969	40 and 15*	23.4	34.4	66.0	148	17	8.7	
	1970	40 and 15*	19.6	34.2	65.8	419	37	11.3	
	1971	40 and 15*	26.4	42.7	57.3	246	25	9.8	
	1972	40 and 20*	21.3	36.0	64.0	337	27	12.5	
	1973	40 and 20*	19.7	35.4	64.6	726	57	12.7	
14	1969	40	16.8	42.4	60.0	220	33	6.6	
	1970	40	27.2	51.0	49.0	202	32	6.3	
	1971	40	20.0	42.0	58.0	50	14	3.5	
	1972	40	34.8	43.5	56.5	23	6	3.8	
	1973	40	18.6	35.0	65.0	159	37	4.3	
15	1969	40	39.3	57.1	45.1	135	14	9.6	
	1970	40	25.0	58.3	41.7	73	15	4.8	
	1971	40	20.7	34.5	65.5	29	7	4.1	
	1972	40	41.5	58.7	41.3	29	5	5.7	
	1973	40	24.2	46.0	54.0	133	20	6.6	
16	1969	40	15.8	41.5	59.1	975	66	14.7	
	1970	40	17.9	38.3	61.7	717	62	11.5	
	1971	40	17.6	40.2	59.8	279	28	9.9	
	1972	40	13.8	31.6	68.4	329	25	13.1	
	1973	40	19.7	39.8	60.2	620	58	10.7	

COYOTE

The coyote (Canis latrans) is about one-third the size of the timber wolf. They average about 25 pounds at maturity, but a large male may weigh as much as 50 pounds. Females are slightly smaller. The coyote stands about two feet high at the shoulders. It's body, including a tail length of 11 to 16 inches, is about four feet long.

It is fairly well established that coyotes mate for life. They breed during winter, from late January to early March. The female will carry her young for 60 to 65 days and will usually give birth to five to seven pups.

The coyote is basically carnivorous, but will eat vegetable matter. Preference is usually for food that is easiest to get, with hares being the number one item in the diet. Carrion is the next largest food item and is most important during the winter. Coyotes will eat most any rodent, deer, elk, bear, sheep or goat carcass if the opportunity presents itself.

The successful encroachment by the coyote into areas where the food supply is often meager and competition is keen is a tribute to the coyote's ability to survive. It is quite likely that the coyote's variable appetite and its adaptability to man's presence are what have allowed it to prevail.

Kodiak

Coyotes do not occur on the Kodiak Island group.

Alaska Peninsula

Coyotes do not occur in this portion of Unit 9 (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Coyotes are abundant throughout the Kenai Peninsula. Their numbers have been increasing over the last five years. This may be partly due to a series of bad winters that have produced a number of winter-killed moose.

Most coyotes are taken incidental to other trapping. They are so difficult to catch that most trappers do not make sets for them. Their numbers will fluctuate naturally even with liberal trapping seasons.

Because of their secretive nature they are seldom photographed. People do like to hear them howling and yipping (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Coyotes range throughout Units 14 and 16. The Susitna and Matanuska Valleys appear to be prime coyote habitat (Jack Didrickson, area biologist, ADF&G, Palmer, pers. comm.).

LAND OTTER

The North American land otter (Lutra canadensis) is a thick set mammal with short legs, a neck as wide as its head, small ears and a muscular body that is broadest at the hips. Its tail is powerful and a little more than a third as long as its head and body. Only the hind feet are webbed. Adults weigh 15 to 35 pounds and are 40 to 60 inches in length. Females are about 25% smaller than males.

When prime, their fur appears black-brown, with the belly slightly lighter in color than the back. The chin and throat are greyish. Otter fur consists of a very dense undercoat overlaid with longer guard hairs.

Land otters in Alaska usually breed in May. One to six pups are born in a den the following year between January and June after a gestation period of 9 to 13 months. Delayed implantation (a period of arrested embryonic growth) accounts for this variation in the length of gestation.

In general, otters are not sexually mature until they are at least two years old. After that, they may produce a litter every year. They can live and breed for more than 20 years.

Land otters hunt on land and in freshwater and salt water. They eat snails, mussels, clams, sea urchins, insects, crabs, shrimp, octopi, a variety of fish, and occasionally birds, mammals and vegetable matter. Almost all the food the otter eats it has caught. Very seldom, if ever, will the land otter eat carrion.

Kodiak Island Group

The land otter is found throughout the Kodiak Island group. This entire area is prime otter habitat. The land otter does not experience drastic fluctuations except in the vicinity of the city of Kodiak, where indiscriminate shooting takes place.

The Kodiak land otter harvest has been low because a large portion of the Kodiak area is not trapped. Only about 10-15 people can be considered serious commercial trappers. Natives have not been historically or traditionally involved in trapping land otters on Kodiak.

A prime land otter pelt will average \$60-\$80. In the past three years otter have averaged over \$50.00 per year. Some barter takes place between local fishermen and fishermen from other states.

Land otters are occasionally seen in the salt water channels near the town of Kodiak. When they appear, the local people derive considerable aesthetic value from viewing the animals (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Land otter are present in this area. No other information is available (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Land otter are abundant along the south side of Kachemak Bay. Along the beach fringe from Homer to Portage their numbers are low. Numbers are also low in the inland areas south of the Kasilof River. In the Kenai River and Swanson River drainages land otter occur in moderate numbers. They were once very abundant along the lower reaches of the Anchor River. Today their numbers are very low. The reason for this decline is unknown.

Because of their high mobility, trapping has had little, if any, effect on land otter on the Kenai Peninsula. Human development can be detrimental in denning areas. For example, a denning area along the Kenai River has been abandoned because of a housing development (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Otter are scattered throughout these units. They occur in moderate to abundant numbers along the Little Susitna River (Carl Wilber, trapper, pers. comm.).

LYNX

The lynx (Lynx canadensis) is the only member of the cat family that is native to Alaska. They weigh from 15 to 35 pounds and are just over three feet long from nose to tip of their five-inch tail.

Mating takes place in late winter, usually in March or April. After a gestation period of about 60 days, the kittens are born under or in a natural cavity such as a windfall, a rocky ledge or spruce tangle. A female will usually produce one to four kittens per litter. Normally, lynx have only one litter per year unless food is scarce in which case they may not produce any young.

The lynx is dependent upon snowshoe hares for the major part of its diet and as a result, lynx populations fluctuate with hare populations. As the hares become more abundant, lynx find more food available, their survival improves and their numbers increase. With the "crash" of the hare population, lynx also "crash" because of food scarcity.

In addition to snowshoe hares, small animals and birds fall prey to the lynx. Lynx rarely kill larger animals, such as caribou calves, but they do scavenge the remains of large mammals killed by wolves, hunters and severe winters.

The pelts of lynx are used for fur and garment trimming.

Kodiak

Lynx do not occur on the Kodiak Island group.

Alaska Peninsula

Lynx are present throughout Unit 9, but numbers are low. No additional information is available (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Lynx are moderate to low throughout the Kenai Peninsula. They are more abundant in the foothills of the Kenai Mountains than along the beaches of Cook Inlet. Their numbers fluctuate with the hare populations.

Trapping effort is high because of high fur prices. Some prime pelts are bringing up to \$200.00.

Some human activities may indirectly favor lynx. Land clearing may stimulate the growth of brush and hare populations and thus lynx numbers (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.)

Upper Cook Inlet

Lynx are found throughout these units. Presently their populations are moderate to high. A downward trend in lynx numbers should occur in the near future as snowshoe hare populations decline. They are sought by trappers because of current high prices. (J. Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.)

MARTEN

The marten (Martes americana) occurs throughout much of Alaska. It has a luxurious brown pelt that is highly prized in the fur trade.

Males will weigh between one and three pounds when adult. They are about 16 inches long, with the tail measuring seven to ten inches. Females are slightly smaller.

Breeding usually takes place in the summer with birth of one to five young the following March or April. Delayed implantation occurs in this species which accounts for the extremely long gestation period (260 to 290 days). This limits the female to one litter per year.

Martens feed on a variety of prey. Their diet consists of squirrels, hares, shrews, mice, birds, eggs, fish and insects. They will eat carrion if other foods are scarce.

The most significant danger to martens is man. Through forest fires, development and encroachment, man can have detrimental effects on marten populations by destroying their habitat, mainly conifers, which marten are specifically adapted to.

Kodiak Island Group

In 1952, 20 marten were released on Afognak Island. The outcome of the Afognak transplant is still not fully understood. Enough marten observations have been reported, however, to indicate this transplant cannot be considered a complete failure (Alaska Department of Fish and Game, 1973). Marten are now distributed in suitable habitat, but since this is limited, numbers are low. A few are taken incidental to other trapping, but coastal marten do not bring a good price (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Marten do not occur in this area (Jim Faro, Area Biologist, ADF&G., King Salmon, pers. comm.).

Kenai Peninsula

Marten are extremely rare on the Kenai Peninsula. A few may be found in the Cooper Landing-Russian Lakes area (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.)

Upper Cook Inlet

Marten may be found scattered throughout the spruce forests of this area. The suspected prime area for marten is the Susitna Valley between the Susitna River and the Alaska Mountain Range (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

MINK

The mink (Mustela vison) belongs to the family which includes weasels, marten, wolverine, etc. They are one of the most valuable and sought after fur bearers in Alaska.

In prime condition, mink are a dark chocolate-brown color with coarse guard hairs and a thick and wavy underfur. Adult males range in length from 19 to 29 inches with an average of about 26 inches. They weigh an average of about 3 3/4 pounds. Females are smaller.

The breeding season extends from March through late April. Young are born mainly during mid-June. Annual differences in the abundance of food available to mink affect both the number of young born and the number which are successfully weaned. Litter size varies from four to ten, with an average of five.

Virtually anything that is alive and can be killed will be utilized as food. This includes a variety of fish, birds, bird eggs, insects, clams, crabs and small mammals.

Mink are most commonly found near streams, ponds, marshes and fresh or saltwater beaches, but an abundance of mice or hares will cause them to move inland in search of prey.

Kodiak

Mink do not occur on the Kodiak Island group.

Alaska Peninsula

Mink do occur in this unit. No additional information is available (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Mink occur on the Kenai Peninsula in moderate numbers. They are most abundant along the major streams, especially those that remain open or partially ice-free in winter. There appears to be some correlation between numbers and the magnitude of salmon runs. The severity of winters may also effect mink populations. Human development, particularly along the Kenai River, may be detrimental to mink.

Mink prices are currently very low (\$7.00), so few trappers bother to pursue them (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Mink occur in this area. No additional information is available (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

MUSKRAT

The muskrat (Ondatra zibethicus) is much smaller than the beaver or porcupine, weighing only two to four pounds. They are 10 to 14 inches long without the 8 to 11 inch tail. The pelage is composed of a short, soft, dense, fine underfur that is interspersed with a

thick, protective coat of long coarse, dark, shining guard hairs which produce the dominant color of the upper parts. The general coloration ranges from a medium silvery brown to dark brown or almost black. The lower surface is generally lighter than the upper parts.

Breeding takes place from the beginning of March or April and continues through fall. After a gestation period of 22 to 30 days, from 1 to 11 young are born. The female is bred again while she is still nursing, so two to three litters are produced annually.

Muskrats are basically herbivorous, feeding on many kinds of aquatic plant material such as cattail roots, typha, lillies or stems. They also eat animal tissue such as mussels and occasionally, fish.

Kodiak Island Group

In 1925, personnel of the Alaska Game Commission conducted a muskrat transplant from the Copper River area to Kodiak. Of the 100 animals shipped from Cordova, 30 were lost in transit. The remaining were released at Clark's Lake and Potatopatch Lake on Kodiak, Monk's Lagoon on Spruce Island, Litnik Lake on Afognak Island and various ponds on Whale Island.

At present, muskrats are established on the Kodiak Archipelago. But densities are so low that they are almost not harvested. This transplant must be considered an economic failure (Alaska Department of Fish and Game, 1973).

Alaska Peninsula

Muskrats occur in this area. No other information is available. (Jim Faro, Area Biologist, ADF&G, pers. comm.).

Kenai Peninsula

Muskrats are uncommon on the Kenai Peninsula. A few may be found along the Swanson River, at the outlet of Skilak Lake and along the east fork of the Moose River. Very few are trapped. (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Muskrats are abundant on the Susitna, Little Susitna and Knik River flats. They are found throughout these units in lesser numbers in most of the low lake country. Because of low fur prices, very little trapping occurs (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

PORCUPINE

The porcupine (Erethizon dorsatum) is a stout short-legged rodent that is 25 to 31 inches long and is covered with hair and quills of varying length except on the feet pads and nose. Their color varies from black to brown with hues of yellow or white on the tips of the long guard hairs. The tail is short and thick and heavily covered with quills. The average weight of an adult porcupine varies between 15 and 18 pounds.

A male porcupine will usually breed with only one female during November. After a gestation period of about 16 weeks the female will give birth to a single young which will weigh between one and two pounds and be about 10 inches long.

Spruce bark may be considered their primary winter food; birch is also important. In summer, they utilize a wide variety of green leaves, buds and aquatic foods which almost entirely replaces the bark in their diet.

These food habits can be injurious to forests and reforestation projects. In some areas, control of porcupines has been justified. However, porcupines are an integral part of the Alaskan faunal scene and should not be thought of as pests merely because they are not economically important to man.

Kodiak

Porcupines are not found on the Kodiak Island group.

Alaska Peninsula

Porcupines occur in this area. No additional information is available (Jim Faro, Area Biologist, ADF&G., King Salmon, pers. comm.).

Kenai Peninsula

Porcupines are found in moderate numbers throughout the Kenai Peninsula. Their population seems to be down somewhat from a few years ago.

Many people like to view and photograph porcupines along the road systems. Many porcupines are killed by highway traffic. (Paul LeRoux, Area Biologist, ADF&G, Palmer, pers. comm.).

Upper Cook Inlet

Porcupines occur in this area. No additional information is available. (Jack Didrickson, Area Biologist, ADF&G., Palmer, pers. comm.).

PTARMIGAN

There are three kinds of ptarmigan; all of which are found in Alaska. The willow ptarmigan (Lagopus lagopus) are found nearly everywhere in high treeless country. Rock ptarmigan (Lagopus mutus) live in all major treeless areas except low flat tundras. White-tailed ptarmigan (Lagopus leucurus) are high country birds that occupy the rugged alpine areas. Sometimes the three species are found on a single mountain, and often two kinds breed close together. In such cases there is usually a clear altitudinal separation of the various kinds, with willow ptarmigan living closest to timberline, rock ptarmigan on middle slopes and low ridges and white-tails high among rough boulder-strewn ridges close to glaciers and snowfields.

All ptarmigan nest on the ground soon after the snow melts. Eggs, usually six to ten per nest, are incubated for three weeks. Hatching takes place in late June and early July.

In winter, willow ptarmigan eat willow buds, willow twigs and some birch; rock ptarmigan nip off birch catkins, birch buds and willow; white-tails mix buds and catkins of willow, birch and alder in varying amounts. This diet lasts into spring, giving way, as snow melts, to a blend of insects, dried berries, new leaves and flowers. As insects disappear and plants become dormant, their diet turns to berries, seeds and buds. By mid-October, most ptarmigan are back on their winter menu.

Ptarmigan numbers fluctuate. As with many other grouse, the population depends on each year's production of chicks. Under these conditions, one or two years of poor reproduction or high winter losses can cause drastic declines in abundance.

Kodiak

Willow and rock ptarmigan are found on Kodiak Island. Their numbers are low on the southeast and southwest sides of Kodiak, but the southwest one-third of the island has a very abundant population. Tugidak Island has very high population at this time.

Approximately 3,000 birds are harvested annually. Not more than 10% of these are rock ptarmigan.

Little non-consumptive use occurs except for an occasional photograph. (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Willow and rock ptarmigan occur throughout this area. White-tails may occur in the northern part; their presence in the vicinity of Katmai National Monument has not been confirmed. (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Ptarmigan are found primarily in the alpine areas of the Kenai Mountains. Some willow ptarmigan may be found in the lowland areas, but only during the winter months. (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Ptarmigan are common in the alpine areas of these units. The Talkeetna Mountains above timberline to 5,000 feet appear to be prime ptarmigan habitat. Ptarmigan numbers are low because of poor nesting success for several years in succession. Willow and white-tailed ptarmigan in upper Little Susitna River drainages and upper Willow Creek may be depressed by heavy hunting pressure.

RED FOX

The red fox (Vulpes vulpes) is found throughout Alaska except for some of the islands of southeastern Alaska and Prince William Sound. It is native to Kodiak, but is an introduced animal on many islands, a result of fox farming operations in the early 1900's.

Red is the most common color, but pelage can vary from light yellowish to deep auburn red to black and silver. The red fox weighs between 8 and 11 pounds. A full-grown male measures 38 to 42 inches in length with a 14 to 16 inch tail. The female is slightly smaller in size.

An average litter of four kits is born in late April. At birth the kits weigh four to five ounces. Normally only one litter is born each year. The kits' eyes open about 10 days after birth, and they leave the den for the first time a month later. The mother gradually weans them, and by the time the kits are three months old, they are learning to hunt. Both parents care for the young.

The red fox is omnivorous and is quick to take advantage of any food item that it can find or catch. Being an opportunist, red foxes eat a variety of foods, including muskrats, squirrels, hares, birds, eggs, insects, vegetation and carrion. Mice, however, seem to be preferred and are probably the number one food item.

Foxes are very adaptable to a wide range of habitat and thrive close to humans, requiring only a source of food and cover. They are subject to periodic outbreaks of rabies, a disease which appears to be endemic in most red fox populations. An epidemic can kill all foxes in a wide area.

Man is probably the principal predator on foxes, followed by wolves, coyotes, lynx, wolverines and perhaps bears. Eagles are a major predator on kits in some areas.

Kodiak Island Group

Red foxes are found on many of the offshore islands and on Kodiak and Afognak Islands. They are not found on Tugidak, Shuyak or Sitkalidak Islands. Most of this area can be considered prime fox habitat. There is a good food supply of carrion on the beaches and in the tide pools; voles, hares, ptarmigan and fish are abundant. Kodiak does not experience drastic population fluctuations.

The harvest of red foxes from Kodiak probably accounts for less than 1% of the statewide harvest. Most are taken for commercial use, but some are harvested by the recreational trapper and used for trim or as wall-hanging decorations.

Little non-consumptive use occurs except for some photography. The animals are so common that few people pay much attention to them. (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Red fox are present in this portion of Unit 9. No other information is available. (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Red fox are rare except for a few that may be found in the Caribou Hills area north of Homer. The limiting factor seems to be deep snows that do not crust over inhibiting the foxes' travel. (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Red fox are abundant throughout these units. It has been reported that the fox population has declined somewhat in the Little Susitna River drainages north of Wasilla. This is probably due to a decline in snowshoe hare numbers.

RED SQUIRREL

The red squirrel (Tamiasciurus hudsonicus) is common throughout the evergreen forests of Alaska. They are smallest of the tree squirrels, averaging about eight inches long with a four to six inch tail.

Ordinarily solitary, red squirrels pair for mating in late winter. There are usually two litters produced each year. In April or May the first litter of two to seven young are born with a second litter arriving in August or September.

Red squirrels eat a wide variety of plant food and occasionally birds' eggs. Their principal food is spruce cones. The storage habit is highly developed in this species, but they only store food in one or two places and only after extensive preparation.

The principal enemy of the red squirrel is the marten. Other predators of the red squirrel include the weasel, large hawks and owls and the mink.

In the Cook Inlet-Kodiak areas the red squirrel is entirely dependent on spruce forests. Any change in these forests will have a direct effect on the red squirrel.

Kodiak Island Grove

A red squirrel transplant consisting of 47 animals captured in the Anchorage area was conducted in July and August of 1952 to Afognak Island, a few months prior to the marten transplant on that island. This transplant resulted in excellent squirrel populations but apparently did little to affect the ultimate success of the marten introduction. Also in 1952, 24 squirrels were released on Cape Chiniak, Kodiak. This introduction was not successful in

establishing a red squirrel population (Alaska Department of Fish and Game, 1973). However, they now appear to have become established along the northeast corner of Kodiak Island (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Red squirrels occur in moderate density over much of their range. Logging will reduce available habitat. There is no human use of red squirrels except for nature study and some photography (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Red squirrels occur in this area. No additional information is available (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Red squirrels are abundant through the Kenai Peninsula. They provide public viewing especially in the campgrounds. Humans appear to have little effect on them except when spruce logging occurs (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Red squirrels occur throughout these units. No additional information is available (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

SNOWSHOE HARE

The snowshoe or varying hare (Lepus americanus) is the most common and widespread hare in Alaska. They average 18 to 20 inches in total length and weigh three to four pounds. In summer, the coat is yellowish to grayish brown with white underparts. This coat

is shed and replaced by white pelage in winter.

Snowshoe hares breed at about one year of age and have two to three litters per year. The gestation period is 36 to 37 days. First litters are born around the middle of May and average about four young. The second litter often averages six young and occasionally there is a third litter.

Snowshoe hare populations are cyclic. The population in an area will build up over a period of years to a peak abundance to be followed by a sudden decline to a very low level. Reasons for the decline are unknown. When hares are very abundant, foxes, lynx, weasels and mink increase because of the abundant food supply. These predator populations decline when the hares die off.

The snowshoe hare offers a great deal of recreation for the small game hunter, especially in years of abundance. The hare is available to most hunters and can be taken along the highway systems. The meat is tasty. Their fur is not durable nor valuable, but it has been used in the manufacture of felt and for trimming and lining garments and gloves.

Kodiak Island Group

The first successful transplant of hares in Alaska was conducted in 1934. A release of 558 snowshoe hares was made on Kodiak and Afognak Islands. This transplant was very successful, and in 1952 hares from Kodiak Island were captured and introduced to the adjacent Woody and Long Islands. These introductions were also successful (Alaska Department of Fish and Game, 1973).

On Kodiak Island, the snowshoe hare occurs in moderate density where habitat is best. They do not have suitable habitat everywhere on the island. Therefore, individual populations fluctuate sporadically.

There is an intense hunting effort both for sport and subsistence use along the Kodiak road system and in the Port Lyons and Ouzinke areas. People seem to enjoy seeing hares and occasionally photographing them (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Snowshoe hares occur throughout this area. No additional information is available (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Snowshoe hares occur throughout the Kenai Peninsula. Their numbers are low now, but some localized pockets do have moderate numbers. Since numbers are low there is little sport use. Most of the hares that are taken are used for trap bait (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Snowshoe hares can be found throughout these units, but numbers today are low. The Matanuska and Knik River drainages appear to be excellent snowshoe hare habitat (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

SPRUCE GROUSE

The spruce grouse (Canachites canadensis) occurs throughout Alaska, but is most common around Bristol Bay and on the Kenai Peninsula. Usual habitat is spruce-birch forest with an understory of mountain cranberry, blueberry, crowberry and spiraea growing on a carpet of sphagnum mosses.

During May, the hen lays five to nine eggs in a shallow nest usually at the base of a spruce tree. Hatching occurs about mid-June. By early September, flocks made up of an adult male and several hens and broods are common. These family flocks disband in October and the smaller groups settle on wintering areas, often in dense stands of spruce.

In winter, spruce grouse feed almost exclusively on spruce needles. As snow melts in spring, the birds spend more time on the ground and supplement their spruce needle diet with cranberries that persisted through the winter. Principle summer and fall foods include cranberries, blueberries, crowberries, green leaves, assorted flowers and seeds. Chicks eat many insects the first few weeks after hatching.

The spruce forest habitat is extremely critical to the well-being of spruce grouse. Wildfires have been the most important cause of spruce grouse habitat destruction in Alaska.

Kodiak

In 1957 and 1959, thirty-one spruce grouse were released on Kodiak Island. No birds remain from these trnasplants (Alaska Department of Fish and Game, 1973).

Alaska Peninsula

Spruce grouse occur in this area. No additional information is available (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Spruce grouse are found throughout the Kenai Peninsula. Presently numbers are low. The spruce grouse population has been low for about three years and should begin an upward trend soon. Hunting appears to have no effect on spruce grouse numbers (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Spruce grouse are present throughout this area. Numbers are low; nesting success has been poor for several years in succession (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

WEASEL

The short-tailed weasel or ermine (Mustela ermina) is one of the smallest carnivores living today. They can be recognized by their small size and short tails with black tips. Males are 10 to 14 inches long with a two-inch tail. Females are slightly smaller. The upper parts of the body and tail are amber brown in summer, with the underparts pure white. During the winter, the animals turns all white.

Weasels mate during February and March. Females will give birth to four to six young after a gestation period of 35 to 38 days. Young are born in a den that may be located in old burrows, hollow trees or any suitable hole. Development of the young is rapid.

They nurse for the first four or five weeks and by the time they are six to eight weeks old they are able to aid in hunting.

Weasels are carnivores. They prey on small mammals and birds, making little use of invertebrate or vegetable foods and showing little seasonal change in diet. They are most active at night. Their slender bodies enable them to enter any burrow or hole into which they can thrust their heads. In this way a weasel can follow a mouse or vole to the end of its burrow. A weasel will remain in a small area until it exhausts most of the food available.

Because they prey primarily on rodents, co-existence with man is possible. Very little knowledge has been obtained about the natural mortality of weasels. It is believed that wolves, wolverine, foxes, coyotes, lynx and raptors may utilize weasels as prey.

Kodiak Island Group

The short-tailed weasel is indigenous to the Kodiak Island group. The entire area appears to be a good weasel habitat. Their numbers are dependent on the vole population. Because of this, they experience short term cyclic fluctuations.

Weasels are rarely trapped except as an incidental catch. Thus their contribution to the commercial or subsistence economy is negligible. An occasional weasel may be photographed, but because of their secretive nature their contact with humans is uncommon (Roger Smith, Area Biologist, ADF&G, Kodiak, pers. comm.).

Alaska Peninsula

Weasels may be found in this area. No additional information is available (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Weasels occur throughout the Kenai Peninsula. Population numbers today are very low. Weasel populations are directly linked to the abundance of voles and shrews. Thus their numbers fluctuate considerably.

A few weasel are taken each year incidental to other trapping. Prices and population numbers are too low to make weasel trapping a profitable venture (Paul LeRoxu, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Weasels occur in these units. No additional information is available (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

WOLF

Wolves (Canis lupus) are the largest members of the dog family. In Alaska, an adult male may weigh up to 130 pounds. Females are slightly smaller. Wolves are sexually mature at 22 months. Females produce their first litter at two years of age, generally in May or early June following a gestation period of about 63 days. Litters average about six pups. In spite of a high birth rate, wolves never seem to become abundant; apparently mortality is high. The relative importance of various mortality factors is not known, but disease, intraspecific strife, accidents, injuries suffered while gathering food and hunting and trapping all account for substantial numbers of wolves. Few wolves in the wild live for 10 years.

Wolves are carnivores. Their principal food in southcentral Alaska is moose and caribou. They supplement this diet with berries, fish, waterfowl, small mammals, sheep and goats. Food consumption probably averages four to seven pounds of meat per wolf per day.

In the past, wolves have been subjected to bounties, unrestricted hunting and trapping and poison. They have survived this treatment and have even become re-established in some areas. In the past 10 years, they have repopulated most the Kenai Peninsula. The state has scorned predator control efforts and eliminated the bounty and has also instituted regulations classifying wolves as big game and furbearers and providing seasons and bag limits appropriate to existing wolf population levels.

Kodiak

Wolves do not occur on the Kodiak Island group.

Alaska Peninsula

Wolves occur throughout GMU 9 and populations are increasing in all areas. Data concerning population levels and composition is lacking.

Past harvest data indicate that in GMU 9, the annual wolf harvest has been about 30 animals. It is unknown how many of these come from the Cook Inlet and Pacific drainages. Due to the rugged terrain, it is unlikely that many, if any, were taken there.

At this time, wolves are not considered a factor regulating the population levels of either moose or caribou. However, should populations of either of these prey species decline significantly, an abundant

wolf population could be a factor in maintaining low moose and caribou numbers (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

Because of their high mobility wolves may be found almost anywhere on the Kenai Peninsula. A minimum of 95 to 100 wolves may be found in Game Management Units 7 and 15.

The first wolf hunting season on the Kenai Peninsula was held in 1975 when 238 permits were issued to hunters. By November 1975, these hunters had taken six wolves. Since that date 12 wolves have been taken. Wolves may now be taken by hunting or trapping. Almost all wolves are taken for sport and recreational use. Few, if any, are sold to fur buyers.

There is no non-consumptive uses of wolves. However, the potential for people to see and hear wolves does exist (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet

Wolves appear to be increasing throughout Game Management Units 14A, 14B and 16. The elimination of aerial wolf hunting may be a factor in this increase. Estimated numbers of wolves are: GMU 14 - 50 to 100, GMU 16 - 150 to 200. Prime wolf areas are the Rainy Pass-Happy River and Upper Talkeetna Rivers.

Between the lower Knik River and Susitna River, large numbers of people and agricultural interests have caused some conflicts with wolves. Generally, this has resulted in the removal of the wolves.

The harvest of wolves from GMU 14 from 1962 to 1975 has ranged from 1 to 30 wolves with an average of 12.2 wolves per year. In

GMU 16 from 1962 to 1975, the harvest has ranged from 2 to 84 wolves with an average of 29.6 wolves per year. In GMU 14, about 60% of the harvest is for sport use while 40% is for commercial use. In GMU 16, the sport harvest is about 25% and the commercial harvest is 75%. On a statewide basis, GMU 14 contributes 1% of the harvest and GMU 16 contributes 3%. Subsistence use is negligible (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

WOLVERINE

Wolverine (Gulo gulo) are the largest land-based weasel and belong to the same family that includes mink, land and sea otter, marten, etc. Adult males weigh from 30 to 60 pounds and are usually three feet long including a six to eight-inch tail. They stand about 12 inches at the shoulders. Females are slightly smaller and lighter.

Wolverines are relatively long-lived animals, with some reaching 13 years of age. Both sexes become sexually mature at 14 to 15 months. It appears that females breed once a year after maturity. The wolverine usually gives birth to two or three kits, but as many as five have been observed.

The specifics of wolverine habitat requirements are unknown, but ample food sources apparently are the key requirement. Almost any item from fruit to the largest ungulate constitutes food. Carrion appears very important; beached marine mammals and winter-killed ungulates are relished.

Recent studies suggest that wolverines are not adversely affected by moderate use of land by man. Instead, the major threat to continued existence of wolverines stems from man's proclivity for killing

carnivores and for severely altering habitats. With moderate protection, wolverines will continue to use habitat adjacent to and within metropolitan areas. In Alaska, there is no evidence that predation by wolverines adversely affects game populations or caused excessive economic loss.

Kodiak

Wolverines do not occur on the Kodiak Island group.

Alaska Peninsula

Wolverine occur throughout Unit 9. Populations appear abundant but baseline data on population size and composition are lacking. Much of the existing trapping pressure is by village residents. Because of the lack of people in this portion of Unit 9, trapping is almost non-existent (Jim Faro, Area Biologist, ADF&G, King Salmon, pers. comm.).

Kenai Peninsula

South of the Kenai River, wolverine numbers are moderate to low. Few are found along the beaches of Cook Inlet. Their numbers increase with increasing altitude in the foothills of the Kenai Mountains.

Wolverine were more abundant two to three years ago. This decrease is probably due to a decrease in prey species. More wolverine appear in the low country when snow gets deep. Although they are extremely difficult to catch, trapping may have some effect on wolverine numbers (Paul LeRoux, Area Biologist, ADF&G, Soldotna, pers. comm.).

Upper Cook Inlet - GMU 14 and 16

Wolverine range throughout these units. In Unit 14 from 1962 to 1975, an average of 20.5 wolverine were taken per year. In Unit 16, an average of 43 were taken each year during the same period. The trapping catch in GMU 14 amounts to about 2.5% of the statewide harvest and 6.5% of the statewide harvest comes from Unit 16 (Jack Didrickson, Area Biologist, ADF&G, Palmer, pers. comm.).

WOLVERINE BOUNTY AND SEALING RECORDS - UNIT 15

Year	Males	Females	Unknown Sex	Total
1961-62 ^{1/}	--	--	1	1
1962-63 ^{1/}	--	--	--	--
1963-64 ^{1/}	--	--	--	3
1964-65 ^{1/}	--	--	13	13
1965-66 ^{1/}	--	--	15	15
1966-67 ^{1/}	--	--	16	16
1967-68 ^{2/}	--	--	19	19
1968-69 ^{2/}	--	--	--	--
1970-71 ^{2/}	--	--	--	--
1971-72 ^{3/}	18	7	0	25
1972-73 ^{3/}	14	6	0	20
1973-74 ^{3/}	11	3	1	15

1) Data from bounty records.

2) Bounty discontinued, no record of harvest.

3) Data from sealing records.

-- Zero data.

MARINE MAMMALS

Marine mammal populations in Alaska have been subjected to human utilization of varying intensities for many centuries. Remains of marine mammals in middens indicate the coastal dwelling natives utilized the resource to a high degree. Historical records indicate that hunting pressure prior to the early 1900's was so intensive that seal, sea lion and sea otter populations in much of Alaska were reduced to low levels. Pressure on seals and sea lions declined sometime after the turn of the 19th century, because natives were no longer dependent upon them for subsistence and white man turned to more economically attractive materials. As a result, seal and sea lion numbers increased. In 1911, sea otters were included in the Fur Seal Treaty and all hunting, except for natives using aboriginal means, was made illegal. Very few otters were harvested over the next 40 years and in many areas numbers began to increase. Today, marine mammal populations are considered to be near or at carrying capacity for the habitat over much of their range.

In 1972, the United States Congress passed major domestic legislation setting U.S foreign and domestic policy for the management of all marine mammals. This legislation took the form of The Marine Mammal Protection Act of 1972. In Alaska, this act has done little more than to place a moratorium on the taking of marine mammals.

Little information exists on the status of sea lion populations in Alaska prior to 1956. Information that is available indicates that the statewide population prior to 1920 was considerably less than it is today. Recent rookery and haulout counts indicate the present population in Alaska is probably in excess of 200,000 animals.

Sea lions were once extensively used by coastal dwelling natives for subsistence purposes. The flesh was eaten, the intestines were used to make waterproof clothing and the hides were used for boots and boat coverings. White man harvested them for oil and hides. Today, there is no subsistence use of the resource. Before The Marine Mammal Act of 1972, a few adult sea lions were taken by commercial fishermen for shrimp or crab bait and an occasional animal was taken for food. The only major use of the resource was a limited harvest of young animals for the fur industry.

Little is known about harbor seal numbers prior to the 1920's. Bounty records and commercial harvest information indicate that the population continued to expand in spite of a continuing harvest.

Harbor seals have long been used for subsistence purposes by natives. Today, there is essentially no subsistence use of this resource. Commercial harvesting of harbor seal skins reached its peak in 1965 and continued to decline each year thereafter. All harvesting of harbor seals ceased with the advent of the Marine Mammal Act of 1972.

Most marine mammals inhabit a very special environment - the near shore community. This environment is extremely susceptible to disturbance in the form of man's encroachment through pollution and removal of components of the system. In particular, petrochemical developments along our coast will inevitably result in the contamination of some marine ecosystems. Degradation of marine habitats, whether resulting from chronic low-level contamination or massive spills, may impact marine mammal populations by lowering ecological productivity as well as by direct injury to animals.

Major conflicts may arise between marine mammals and man for the use of valuable food species. Salmon purse seine fishermen complain of seals and sea lions occasionally getting into their nets causing partial or complete loss of their catch and damage to nets. Salmon trollers often report sea lions stealing hooked salmon from their lines. Gill net fishermen often complain of sea lions robbing their nets and tearing up gear. King crab fishermen report that sea lions cause the loss of crab pots by biting and sinking the inflated plastic buoys which mark the pots.

There are currently no established uses of sea otters. Traditional use by Alaska natives ceased during the period of commercial hunting and subsequent closures. While the federal closure from 1911 to 1960 allowed for such use, there was no conflict when the state laws prohibiting any use went into effect in 1960. The present estimate of sea otters in Alaska is 100,000 to 125,000 (Alaska Department of Fish and Game, 1973).

Sea otters exert a profound effect on many littoral species of invertebrates and possibly on certain species of bottom fish. Only a few superficial attempts have been made to quantitatively measure this effect; however, certain relationships are strongly indicated by the information that is available.

Sea otters may eat 8 to 15 pounds of digestible food per day. In areas of high sea otter density (up to 100 per square mile), certain favored food species may be either greatly reduced in numbers or have a substantial reduction in the age structure and maximum size. For example, the appearance of large numbers of sea otters in an area may greatly reduce the number of green sea urchins in some areas, particularly intertidal areas. However, in other

areas there may be an increase in sea urchin numbers but very few of these will reach maturity. In many areas the extent of kelp beds is restricted by the grazing of mature sea urchins. Reduction of the age structure of sea urchins often permits expansion of kelp beds and this in turn may provide better habitat for certain other vertebrates and invertebrates. The result may be an overall increase in the productivity of the ecosystem and potentially enhance sport and commercial fisheries.

This increase in productivity may not always be considered beneficial to specific fisheries, as few species of mollusks, crabs or sea urchins would exist at harvestable levels. An example is the present conflict between sea otters and the abalone fishery in California where few abalone reach harvestable size in areas with dense sea otter populations.

No such conflicts exist in Alaska today; however, there is a potential for such a conflict to develop with future dungeness crab and sea urchin fisheries. Where the fishery is limited to waters greater than 30 to 40 fathoms deep few problems should develop as sea otters are not able to dive to these depths. But in shallower waters, it may be impossible to maintain commercial shell fisheries and high sea otter populations.

On the other hand, most sea otter populations that have fully recovered from exploitation appear to be regulated by food availability. Any factor affecting the availability of sea otter food species, such as commercial fishing or changes in water quality, may have a profound effect on the sea otter population.

HARBOR SEALS

The harbor seal, Phoca vitulina, is a member of the family Phocidae that includes "true" seals. They differ from their nearest relatives the sea lions, fur seals and walruses in that they have no external ears, have flippers that cannot be turned forward and may be found in a marine, estuarine or fresh water environment. In Alaska, it is known also as the common or spotted seal. It is the only hair seal (phocid) found in southern Alaska and the Aleutian Islands. From Bristol Bay north, it shares its range with bearded seals, Erignathus barbatus, ribbon seals Histiophoca fasciata and ringed seals Pusa hispida.

Harbor seals usually occur in close proximity to the coast although sightings of animals a mile or two offshore are not unusual. Spalding (1964) did not consider the harbor seal a pelagic species and states that they are seldom found more than five miles from shore. Bigg (1969) supports this as he states that "harbor seals live mainly along the coast." However, it is apparent from observations made by the National Fisheries Service during pelagic fur seal investigations that individual animals occasionally do occur some distance offshore. They made a number of sightings, nearly all of single animals, up to 50 miles offshore. Seals thrive equally well in areas with rocky or muddy ocean bottoms. Unlike sea lions and sea otters, which prefer relatively clear water, harbor seals occupy both clear and turbid waters. They are able to catch fish in silt-laden glacial streams and at the bases of glaciers extending to the sea.

Haul-out areas include offshore rocks, sandbars and beaches of remote islands. Floating ice pans calved from glaciers are used for hauling out when available. During winter, ice shelves which form at the heads of bays are frequently used as hauling platforms.

The average weight of the adult harbor seal is about 200 pounds and length is five to six feet. Their color varies greatly, but is basically a bluish-grey on the back with a scattering of black spots and irregular white rings and loops; the belly is silvery-white with scattered dark spots. Occasionally, there are marked differences in coloration between seals of two different bays or fiords.

From southeastern Alaska to the Aleutian Islands, harbor seals give birth between late May and mid-July, with most pups being born during the first three weeks of June. Birth occurs on sandy beaches or remote reefs and rocks or on glacial ice pans. Usually one pup is born but twinning does occur. Newborn pups are about 35 inches long and weigh about 28 pounds. The pups are able to swim almost immediately after birth and often take to the water before the next high tide covers their birth place. Pups are usually weaned after three to four weeks.

Female harbor seals attain sexual maturity when three or four years old. Mating usually occurs in July, shortly after the females have stopped nursing their pups. Delayed implantation occurs and embryonic development is retarded for about two months. The period of active fetal development is about 8.5 months. These seals are relatively long-lived, and some survive longer than 30 years in the wild.

The most common foods eaten by harbor seals are fish and crustaceans. K. Pitcher (A.D.F.&G., Anchorage, Ak., pers. comm.) reported that as of September 1, 1975 he had analyzed stomach contents from 161 seals collected in the Prince William Sound-Copper River Delta area. Dominant species included Alaska pollock (Theragra chalcogramma), herring (Clupea harengus), eulachon (Thaleichthys pacificus), and octopus (Octopus sp.). Other species identified included shrimp (Pandalus sp.), squid, salmon (Oncorhynchus sp.), sand lance (Ammodytes hexapterus) and starry flounder (Platichthys stellatus). This wide variety of food items indicates that seals will take what is most readily available at the time of feeding.

Other than man, their only major predators appear to be killer whales and sharks, although some may be taken by eagles and wolves. Some mortality does occur when rookery areas are disturbed during pupping. This disturbance increases the rate of abandonment of pups. Very few cases of severe pathology have been observed in harbor seals. Almost all adult seals have roundworms and spiny-headed worms.

Seals tolerate moderate boat traffic through their marine habitat and some disturbance. Although seals may be able to tolerate low levels of pollution, large amounts of oil or other toxic substances in the water would be detrimental by harming seals and their food supply.

Remote beaches such as those found on Tugidak and Ugak Islands are critical to the successful pupping and breeding of harbor seals. Disturbance of these areas should be avoided, especially during the months of June and July. The number of seals frequenting an

area such as Tugidak Island begins to grow in late May. By the first week in June, newborn pups begin to appear and by mid-June pupping reaches its peak. Females with pups will remain on the beaches until the pups are weaned and breeding begins, usually in July. During hunting operations at Tugidak Island hundreds of seal pups were left abandoned. It appears that some abandonment is natural, but disturbances by man cause the abandonment rate to soar (E. Klinkhart, A.D.F.&G., Anchorage, pers. comm.).

In arctic Alaska the harbor seal has long been a source of food and clothing for the Indian and Eskimo. However, in southern waters his habit of plundering fishermen's nets has resulted in considerable persecution by fisheries interests. They were regarded as a nuisance and as a result, in 1927 a \$2.00 bounty was placed on all seals. In 1939, this was increased to \$3.00. This \$3.00 bounty was retained until 1967 when the Alaska Legislature eliminated the bounty in southern Alaska. During that 40-year period over one million dollars was spent on bounties. As a whole, the bounty system did not control seal numbers.

In 1962-63, Alaskan harbor seals entered the European fur market, a market which annually consumes up to 500,000 seal skins. High prices were paid for raw seal skins, stimulating a great deal of interest in harvesting the animals. In 1964, an average prime adult skin was worth \$20.00 to the hunter; choice pelts brought as much as \$50.00; pup skins averaged about \$17.00 each (Alaska Department of Fish and Game, 1964). The estimated yearly harvest in Alaska, south of Bristol Bay, climbed from about 6,000 to 10,000 seals prior to 1963 to over 50,000 in 1965. The market prices of seal hides then dropped, resulting in a significant decline in hunting

pressure. The seal harvest in 1966 dropped to less than 30,000 and continued to decline each year thereafter.

Widespread public concern for the welfare of harbor seals and other marine mammal populations has been demonstrated in recent years. The Marine Mammals Protection Act of 1972 (Public Law 92-522) was a misguided result of this concern. In general, this act placed a moratorium on the taking of all marine mammals and placed the responsibility for their management under federal jurisdiction.

Harbor seals have not been studied extensively in the Cook Inlet-Kodiak area and direct population enumeration work has been done only in a few selected places. The secretive nature of the animals coupled with the broad expanses of habitat they are found in make direct population estimates difficult.

The population estimates presented in this report were calculated using known harvest levels and their apparent effect on the population combined with information on reproductive rates. Estimates by this method tend to be low because of several factors. They do not include natural mortality which may be somewhat compensated by high harvests but is not eliminated. Mortality of pups may be particularly significant. Harvest data does not include sinking loss (which can range from 0-50%) or animals which are wounded and later die. When prices for seal skins were very high unknown numbers of seals were not bountied and may not be included in the harvest data.

In some areas hunting was never intensive and little insight into population size can be gained from harvest data. The only basis for population estimates in these areas are observation of relative abundance and knowledge of available habitat.

It appears that the waters of upper Cook Inlet are poor habitat for harbor seals, except during the summer salmon runs. It is impossible to compute the seal population of Cook Inlet, but an idea of seal numbers may be constructed from bounty records during the 1960's.

Upper Cook Inlet Seals Taken For Bounty, 1961-1966

<u>Year</u>	<u>Number of Seals Bountied</u>
1961	407
1962	488
1963	674
1964	962
1965	979
1966	442

Note: An average of 37% were taken each year from the Susitna River.

Harbor seals are present year-round along the western shore of lower Cook Inlet. Concentrations of several hundred seals occur in the vicinity of Augustine Island, Cape Douglas and along the Alaska Peninsula in Hallo Bay and Kukak Bay (Prasil 1971). The location and magnitude of pupping is not known. The Kamishak Bay-Augustine Island area received some hunting pressure in the mid-1960's and a reported 500 seals were taken in the area in 1964. Department biologists saw 50-60 seals hauled on ice along the south side of Augustine Island on April 9, 1971.

The Barren Islands, well known for the large numbers of sea lions which utilize the area, also have a substantial number of harbor seals. Alaska Department of Fish and Game (1973) reports

high density harbor seal numbers on Sud Island, the south side of Ushagat Island and part of West Amatuli. Bounty records show a harvest of 1,001 seals in 1964 and about 500 in 1965.

Much of the coast of Shuyak Island is excellent seal habitat, particularly the western portion. In 1966, 926 seals were reported taken from the Shuyak area. High density seal areas on Afognak Island include Seal Bay and Perenosa Bay. Nearly 800 seals were bountied from these areas in 1965. Seals are found along the entire coastline of Kodiak Island. Concentration areas include Cape Chiniak, where 931 seals were counted and Ugak Island where 2,796 were seen (Mathisen and Lopp, 1963). Fish and Wildlife Service biologists reported seeing 200 seals at Ayakulik Island during January 1973. Sitkalidak Island, particularly the southeastern shore, is reported as a concentration area (A.D.F.&G., 1973). Ben Ballenger, A.D.F.&G reported seeing 500 seals here on August 27, 1970. In March 1968 a hunter reportedly took 250 seals from Sitkalidak in a single week. On the southern end of Kodiak, Geese Islands, Aiaktalik Island and Alitak Bay are all reported as high density harbor seals areas (Alaska Department of Fish and Game, 1973).

The Trinity Islands south of Kodiak host one of the largest known harbor seal concentrations in Alaska. While seals are present all year in the area, large numbers concentrate during June and July for pupping and breeding. The western and northern shoreline of Tugidak Island contain the largest numbers of seals. In 1968, a Department biologist counted nearly 9,000 seals on Tugidak. Bishop (1967) estimated the Tugidak population at 12,000-17,000 including up to the 5,500 pups. In 1964 and 1965 about 5,000 seals were harvested from Tugidak each year. Sitkinak Island also

has large numbers of seals; 1,000 to 1,500 animals were seen on an aerial survey on June 21, 1972.

Harbor Seal Pup Harvest, Tugidak Island 1965-1972

1965 - 4,100	1969 - 900
1966 - 2,200	1970 - 1,160
1967 - 700	1971 - 1,100
1968 - 800	1972 - 1,100

There is little information from Chirikof Island, but it appears to be good seal habitat. Several hundred seals were bountied from Chirikof in 1966. During sea otter surveys of the area, Calvin Lensink reported seeing harbor seals (Alaska Department of Fish and Game, unpublished data).

Tugidak Island Aerial Seal Surveys

Date	1965	1966	1967	1968	1969	1970
March 29				1,600		
May 15				800		
May 28		500				
May 30	300					
June 6						4,000
June 12				3,200		6,000
June 14	1,000					
June 15		3,000			7,800	
June 17	8,900	100				
June 18			3,400	4,500		
June 21		1,100				
June 22	3,500					4,300
June 25	6,650					
June 26		1,300				
June 29			5,100			3,150
July 7						2,300
July 9		3,400				3,000
July 16						2,000
July 19		1,400				
July 23						3,500
Aug. 22						6,600
Oct. 15				1,500		

SEA LION

The Northern, or Steller's sea lion Eumatopias jubatus are members of the family Otariidae which includes sea lions and fur seals. They differ from the common seals Phocidae in that they have hind flippers that can be turned forward and used in a more four-footed method of movement on land, have external ears, and are found almost exclusively in a marine environment. They are the only sea lion found in the Gulf of Alaska.

Sea lion pups are most commonly born during late May and June, with the majority of pupping occurring during the first two weeks in June. Usually only one pup is produced, but twinning occurs rarely. The average weight at birth is 44 pounds. Females eventually weigh 600 to 800 pounds, and males may grow as large as 2,400 pounds.

Breeding activity begins in late May when mature bulls begin defending territories on the coastal rookeries. Females may move about the territories, but all intruding males are challenged. On large rookeries, males generally have 14-17 females within their defended areas. Most females breed within a week or ten days after giving birth, with the peak of breeding activity occurring in mid-June.

Not all sea lions go to rookery areas during the breeding season. Large numbers of bulls occupy male hauling grounds, generally located adjacent to rookeries. Also, males and females without pups may gather on hauling grounds where males also defend territories and engage in breeding activities. Territorial behavior by males begins to decrease around the first of July and by mid-July most breeding activity has ended.

Pups are capable of swimming within hours after birth but most do not venture into the water until they are at least a month old.

By late July, rookery populations begin to decline as some territorial bulls and females without pups leave the area. Hauling grounds that contained few or no sea lions during the summer gradually begin to attract more animals, but the number using each hauling ground varies from day to day and month to month.

As many as 25% of adult females fail to produce a pup each year. In addition, more than half the new pups die in their first year. Drowning, abandonment, malnutrition and predation are the major causes of death. Killer whales, sharks and men prey on adults as well as pups.

Sea lions are generally shy animals and rush to the water when approached by man, except during the June breeding season. During that month, sea lions on rookeries show great reluctance to leave the land. Although most females will finally flee when a man approaches too closely, some become very protective of their pups and refuse to leave their sides. Similarly, many males continue to defend their territories against all intruders, including men.

During winter, some sea lions move into the more protected waters of bays and inland passages. They use hauling grounds that may have been unoccupied in summer and often follow predictable feeding patterns, such as moving into herring spawning areas in spring.

Although sea lions live in the marine environment, they occasionally ascend freshwater rivers for short periods of time. They seem to thrive best in remote island areas with extensive shallow water and rocky bottoms highly productive with fish life.

Offshore rocks exposed through all stages of the tide are important as resting areas. Sea lions are excellent swimmers and

range widely in search of food. They are uncommon in glacial areas where the water is turbid, and prefer relatively clear waters.

Sea lions eat a wide variety of foods including rockfish, sculpin, cod, greenling, sand lance, smelt, salmon, halibut, flounder, octopus, squid, shrimp and crab.

Sea lions have long been considered an enemy of fishermen because of their dietary preference for fishes. But few quantitative data are available concerning the extent of predation on commercially exploited fishes.

Populations of sea lions have been exploited by man throughout history. The earliest records of harvest of sea lions comes from middens near native village sites and show that sea lions were used extensively. In fact, there are indications that sea lion populations were reduced prior to the early 1900's by subsistence hunting.

Commercial interest in sea lions brought about harvests of pups for their pelts. Over 45,000 sea lion pups were recorded harvested from Alaskan rookeries from 1959 through 1972 (Calkins et al 1975). The Marmot Island and Sugarloaf Island rookeries contributed 31,070 of this total. The average price paid to the hunter for sea lion pup skins was about \$8.00. All harvesting of sea lions ceased with the advent of the Marine Mammals Act of 1972.

Surveys by the Alaska Department of Fish and Game biologists and information from other marine mammal biologists indicate that there are 32 different rookeries and hauling areas in the Cook Inlet, Kodiak and Shelikof Strait areas. Sea lion rookeries and haul out areas are found on a variety of different substrates ranging from sand to beaches with boulders up to 10m in diameter, to bedrock. These areas are often found on exposed points or isolated small islands.

Sea lions usually inhabit offshore rocks and islands that are seldom visited by man, but human activities may cause animals to leave rookery areas. Vania, 1971, found that since the harvesting of sea pups began, a gradual decline occurred in the number of adults that utilized the Sugarloaf Island rookery. When harvesting was closed, adult numbers again increased. Since rookery and haul out areas are vital to the well-being of sea lions, careful planning must be made before these areas are disturbed by man.

Apparently a large proportion of sea lion populations haul out on traditional rookeries and hauling grounds. Rookeries and summer hauling areas are almost exclusively located along the outside coast. Generally, these areas are also used in winter, but in some instances by reduced numbers of animals. In winter, some movement of sea lions into more sheltered, inside waters occurs.

Although breeding females and mature territorial bulls are strongly tied to rookeries, Sandegren (1970) observed considerable movement to and from a rookery. Some territorial bulls went to sea occasionally while others remained on the rookery for over 60 continuous days. Females tended to make periodic trips to sea, probably for feeding purposes, but cows about to give birth, who have just given birth, or are estrous were reluctant to leave the rookery. Peak numbers of animals are usually ashore about midday (Mathisen and Lopp 1963 and Sandegren 1970). Stormy weather, high surf, high tides, disturbance and high solar radiation all appear to cause animals to return to the water. Numbers of animals found hauled out are usually greatest during summer (Mathisen and Lopp 1963). Population estimates based on rookery and hauling ground counts must be considered minimal as some animals will almost certainly be in the water at any given

time. The various factors which influence haul out behavior must be considered when planning a rookery count or when interpreting the results (Pitcher 1975).

The following is an account of each rookery or haul out area as reported by Calkins et al, 1975, and Pitcher 1975.

East Chugach Island, Perl Island, Elizabeth Island, Nagahut Rocks

These islands comprise the Chugach group and are located on the coast of the Kenai Peninsula near the entrance to Cook Inlet. Several small hauling areas exist on these islands with the following numbers from either Alaska Department of Fish and Game (1973) or Mathisen and Lopp (1963): East Chugach Island - 20, Perl Island - 737, Nagahut Rocks - 80, and Cape Elizabeth on Elizabeth Island - 129.

Flat Island

One and four-tenths north of Magnet Rock, 300 sea lions reported here by Alaska Department of Fish and Game (1973).

West Amatuli Island

One of the Barren Islands in the middle of the entrance to Cook Inlet between the Chugach Islands and Shuyak Island. Alaska Department of Fish and Game (1973) gives population of 1,600.

Sugarloaf Island

One and one-tenth miles south of East Amatuli Island in the Barren Islands, Sugarloaf Island has one of the largest sea lion rookeries in the Gulf of Alaska. Alaska Department of Fish and Game (1973) has the population at 10,000 while Mathisen and Lopp (1963)

counted 11,998 sea lions. Pup production has always been very high here. Estimates made by Vania, (1967 and 1968) show 5,200 pups in 1967 and 3,000 in 1968.

Ushagat Island

The westernmost and largest of the Barren Islands. Population given by Alaska Department of Fish and Game (1973) as 100 and by Mathisen and Lopp (1963) as 834.

Latax Rocks

The northernmost feature of the Kodiak-Shuyak-Afognak group, 3,300 sea lions have been counted here. (Mathisen and Lopp, 1963 and Alaska Department of Fish and Game, 1973).

Sea Lion Rocks

Five and one-half miles eastward from Tonki Cape and four miles northward from Marmot Island. 500 sea lions listed in Alaska Department of Fish and Game (1975) and 1,600 by Mathisen and Lopp (1963).

Tonki Cape

The northeast end of Afognak Island shown only in Alaska Department of Fish and Game (1973) with 100 sea lions.

Marmot Island

Parallels the eastern side of Afognak Island. This, along with Sugarloaf Island in the Barren Islands, is one of the two largest sea lion rookeries in the northeastern Gulf of Alaska. Alaska Department of Fish and Game (1973) gives total population as 10,000 animals while Mathisen and Lopp (1963) show 5,790 for their highest

count. This rookery produces a large number of pups with Vania reporting 5,900 pups in 1967 and over 5,000 in 1968 (Vania, 1967 and 1968).

Long Island

The easternmost island in the northern end of Chiniak Bay. Fifty to 75 sea lions have been sighted hauled out here (Alaska Department of Fish and Game, Mathisen and Lopp, 1963).

Cape Chiniak

The southeast point of Chiniak Bay, Mathisen and Lopp (1963) show 772 while Alaska Department of Fish and Game (1973) shows 600 sea lions.

Ugak Island

Two and one-half miles off Narrow Cape, 440 sea lions shown in Mathisen and Lopp (1963) and Alaska Department of Fish and Game (1973).

Cape Barnabas

The eastern end of Sitkalidak Island 2,487 sea lions sighted here by Mathisen and Lopp (1963), 1,000 by Alaska Department of Fish and Game (1973).

Twoheaded Island

This island is off the southern extremity of the western shore of Sitkalidak Strait and has a population of 3,608 to 4,261 sea lions (Alaska Department of Fish and Game 1973, Mathisen and Lopp 1963).

Cape Hepburn

At the southern tip of Hepburn Peninsula in Alitak Bay, no recent counts recorded.

Sitkinak Island

Northeasternmost island of the Trinity Islands off the south end of Kodiak Island, 470 sea lions (Mathisen and Lopp 1963, Alaska Department of Fish and Game 1973).

Chirikof Island

Sixty miles south-southwest of the Trinity Islands Alaska Department of Fish and Game (1973) shows 500 sea lions here while Mathisen and Lopp (1963) counted 2,450.

Sundstrom Island

Off the southwest end of Aiaktalik Island between the south end of Kodiak Island and the Trinity Islands. Listed in Alaska Department of Fish and Game (1973) with 100 sea lions.

Outer Seal Rock

About two miles west of Cape Ikolik on the southwestern end of Kodiak Island, Alaska Department of Fish and Game (1973) shows this area to be used by 50 sea lions.

Tombstone Rocks

About a mile off of Middle Cape on the western side of Kodiak Island, 50 sea lions (Alaska Department of Fish and Game 1973).

Middle Cape

The westernmost promontory on Kodiak Island, 25 sea lions (Alaska Department of Fish and Game, 1973).

Cape Ugat

On the eastern shore of Shelikof Strait 12 miles southwest of Cape Uganik, Alaska Department of Fish and Game (1973) lists 50 sea lions using this haul out.

Cape Paramanof

The northwest end of the peninsula included between Paramanof and Malina Bays on the west side of Afognak Island. 50 sea lions shown in Alaska Department of Fish and Game (1973).

Augustine Rocks

Nine miles south of Augustine Island in Kamishak Bay in the southeast corner of Cook Inlet, Alaska Department of Fish and Game (1973) lists 500 sea lions here.

Cape Nukshak

Thirty-six miles south of Cape Douglas on the Alaska Peninsula, used by 500 sea lions (Alaska Department of Fish and Game, 1973).

Cape Ugyak

Eight miles south of Cape Nukshak, used by 100 sea lions according to Alaska Department of Fish and Game (1973).

Cape Gull

Five miles south of Cape Ugyak, 100 sea lions (Alaska Department of Fish and Game, 1973).

Takli Island

Between Cape Atushagvik and Cape Ilktugitak, north of Katmai Bay, no recent counts.

Puale Bay

Between Cape Kekwinoi and Cape Aklek on the Alaska Peninsula in the southern part of Shelikof Strait, Alaska Department of Fish and Game (1973) shows 2,800 animals.

SUMMARY OF SEA LIONS ROOKERY AND HAULING GROUND COUNTS

Number	Area	Date	Number of Sea Lions
363	East Chugach Is.	1963a	20
446	Perl Is.	1963a	737
361	Cape Elizabeth	1963a	129
362	Nagahut Rocks	1963a	80
360	Flat Is.	1973b	300
326	West Amatuli Is.	1973b	1,600
329	West End Amatuli Is.	1973b	100
325	Sugarloaf Is.	1963a	11,998
		1973b	10,000
	Rocks sw of Sud Is.	1964b	800
328	Ushagat Is.	1963a	834
		1964b	1,500
		1973b	100
323	Latax Rocks	1973b	3,300
		1963a	500
		1973b	1,600
321	Tonki Cape	1973b	100
320	Marmot Is.	1963a	5,790
		1973b	10,000
258	Long Is.	1964b	50
		1966b	5
		1973b	75
257	Cape Chiniak	1963a	772
		1966b	290
		1973b	600
256	Ugak Is.	1964b	100
		1973b	440
255	Cape Barnabas	1963a	2,487
		1973b	1,000

continued

continued - Summary of Sea Lions Rookery and Hauling Ground Counts

Number	Area	Date	Number of Sea Lions
251	Twoheaded Is.	1964b 1966b 1973	1,800 2,600 4,000
252	Cape Hepburn	--	--
250	Sitkinak Is.	1963a	470
245	Chirikof Is.	1963a 1973b	500 2,450
246	Sundstrom Is.	1973b	100
266	Outer Seal Rock	1973b	50
267	Tombstone Rocks	1973b	50
268	Middle Cape	1973b	25
259	Cape Ugat	1966b 1973b	400 50
322	Cape Paramanof	1973b	50
410	Augustine Rocks	1973b	500
324	Cape Nukshak	1973b	500
316	Cape Ugyak	1973b	100
315	Cape Gull	1973b	100
317	Takli Is.	--	--
265	Puale Bay	1973b	2,800

SEA OTTER

Sea otters (Enhydra lutris) are members of the weasel family (Mustelidae) and are related to mink and land otters. Adult males weigh 70 to 90 pounds with some individuals weighing 100 pounds. Females average 40 to 60 pounds. Adults reach a length of four and one half feet. The hind feet are webbed and are used for swimming. While the toes on the fore feet are short and stiff, the animal is able to use them deftly to handle food objects. Sea otters are adapted to ocean life but on land their gait is clumsy and they are easily run down by a man. Probably because of this vulnerability, they are seldom found more than a few yards from water.

In the water they are graceful and powerful swimmers capable of quickly covering considerable distances above or beneath the surface. When chased they sometimes swim porpoise style, alternately swimming underwater and arcing above the surface for air.

The fur, which is possibly the finest in the world, consists of very dense fine underfur of inch-long fibers and very sparse guard hairs. The underfur ranges from brown to almost black. Guard hairs may be black, pale brown or silver, often giving a "veiling" effect of silvery hairs on a dark background. Older animals often develop a silvery head. This combined with the prominent whiskers leads to the nickname of "Old Man of the Sea."

Unlike seals, which rely on a heavy layer of blubber for protection against the cold North Pacific waters, the sea otter must depend upon air trapped in its fine dense fur for maintaining body temperature. If the fur becomes soiled or matted by material such as oil, the insulating qualities are lost. This results in loss of

body heat and eventually death. For this reason, otters spend much time cleaning and rubbing their fur to keep it clean.

Perhaps the most characteristic behavior of sea otters is their habit of swimming on their backs. In this position they propel themselves with their hind flippers, using them alternately like paddles. They may be seen in shallow off-shore areas, often in kelp beds, floating on their backs, feeding, preening or sleeping.

Sea otters mate at all times of the year, and their young may be born at any time. However, more appear to be born in late spring than any other time of the year. Like other marine mammals, they have only one pup during each breeding cycle. In rare cases, twins are born but it is unlikely that the female could care for both of them and probably at least one dies. Pups weigh three to five pounds at birth and are light brown in color. The female cares for the pup for almost a year. Her maternal instinct is very strong and she seldom leaves her pup except when diving for food. When traveling, sleeping or preening, the pup usually rides it's mother's chest as she floats on her back. The pup may weigh 25 pounds when weaned and looks almost as big as its mother.

Females usually won't mate while they have pups with them. As a result they average one pup every two years.

Sea otters do not migrate and seldom travel far unless an area has become overpopulated and food is scarce. They are gregarious and may become concentrated in an area, but they do not normally form herds. An exception is pods of up to several hundred animals, which occasionally form off-shore. They usually do not defend territories but breeding males will drive nonbreeding males out of areas where females are concentrated. Bald eagles prey on newborn pups and killer

whales may take a few adults but predation is probably insignificant. Many sea otters live for 15 to 20 years.

Fish, sea urchins, rock oysters, crabs, mussels, various other mollusks and octopus make up the normal diet of sea otter. They usually dive to the bottom in 5 to 250 feet of water and return with several pieces of food, roll on their backs, place the food on their chests and eat it piece by piece using their forepaws. Occasionally one will crack clams by hitting them together or even by placing a rock on its chest and pounding the clam against it. In the wild, sea otters never eat on land.

The search for food is one of the most important daily activities of sea otters, as large amounts are required to sustain the animal in healthy condition. Feeding dives generally last less than one minute although some otters are capable of staying underwater for 5 minutes or more.

Captive animals required a daily food intake of clams, fish and octopus equal to one-fifth to one-quarter of their body weight. In order to obtain the 8 to 15 pounds of solid food needed, an otter may have to bring up 40 to 50 pounds of whole shellfish.

Sea otters once occupied the shallow coastal waters of the North Pacific from southern California north through the Aleutian Islands to the Kamchatka Peninsula and south to the northern islands of Japan. In 1742, Vitus Bering's men returned with sea otter pelts from the historic voyage of discovery of Alaska. These rich furs stimulated interest and initiated an era of exploitation which almost wiped out the sea otter. Between 1742 and 1911 commercial fur hunters reduced sea otters to an extremely low population level. Perhaps fewer than 2,000 remained in the world by 1911 when they were given complete protection under the Fur Seal Treaty Act.

Historical records indicate that sea otters were fairly abundant along the North Gulf Coast and in Prince William Sound prior to intensive Russian hunting which began about 1795 (Lensink 1962). It appears that by 1800, however, populations of sea otters in the area had been reduced to very low levels. Continued Russian hunting through 1867 and American exploitation until 1911 prevented their recovery.

Small, remnant groups of animals apparently survived in isolated areas as indicated by Kenyon's (1969) report of two, illegally taken sea otter skins seized by the government at Seward in 1924. Repopulation to current levels undoubtedly was the result of build up and dispersal of these remnant groups.

Kenai Peninsula

From Cape Puget to Port Graham on the Kenai Peninsula, sea otters have been reported scattered but no large numbers prior to 1967. In approximately 1967 large numbers of otters began to be regularly sighted on the southern tip of the Kenai Peninsula in the area from Koyoktaluk Bay to Chugach Bay. In 1968 on a survey of this area 400 otters were seen. Lensink 1960 reports a sighting of 15 animals near Elizabeth Island in 1953 while Kenyon 1969 felt that no significant population of otters occupied the area. The apparent movement of large numbers of otters to the southern tip of the Kenai Peninsula, probably from the Barren Islands, and subsequent expansion up the southeast side of the Kenai, probably occurred in 1966 to 1968. At the same time otters from Prince William Sound probably moved into the eastern portion of the area.

An aerial survey conducted by the Alaska Department of Fish and Game in October of 1975 confirmed that concentrations of sea otters did occur along the Kenai Peninsula, east to Cape Puget. Results of the survey are presented in the following table. The Kenai Peninsula information should only be used to indicate the presence of animals and can in no way be extrapolated to give total numbers. More work is required in the area to delineate the population. Reports from the public since 1970 indicate that up to 200 otters are regularly seen in Port Graham and that small numbers are straying into Kachemak Bay. Sightings north of Kachemak Bay as far as Ninilchik are increasing.

Barren Islands

In the Barren Islands sea otter sightings date back as far as 1931, with a record of 2 otters near Sud Island. Sea otters have been sighted regularly in the Barren Islands since, with the highest count prior to 1970 of 325 which was made in 1957 and reported by Lensink (1969). Kenyon (1969) reports 272 otters in the Barren Islands from a 1959 survey and estimates 363 from this.

In June of 1970 Schneider flew a survey of the Barren Islands in a Grumman Goose with himself as the only observer. Offshore coverage was poor although conditions and visibility were good. A complete count of the Barren Islands was made with a total count of 307.

Sea otters counted on aerial surveys of the Kenai Peninsula.

June, 1970 - January, 1971 and October 1975.

Area	June 5 & 9	July 15-20	Aug. 14	Oct. 12	Nov. 12	Jan. 12	Oct. 1975
C. Junken-C. Resurrection	5	30	42	27	10	30	40
Resurrection Bay	2	2	0	4	2	NS	41
Aialik Bay	1	20	5	8	0	21	41
Harris Bay	8	18	7	5	3 *	21	88
Nuka Bay	106	56	NS	31	28	27	47
Port Dick	0	11	NS	NS	3	23	63
Rocky Bay-Port Chatham	121	125	NS	NS	9	26	157
Koyuktolik Bay-Port Graham	<u>0</u>	<u>0</u>	<u>NS</u>	<u>NS</u>	<u>0</u>	<u>NS</u>	<u>53</u>
Total:	243	262	54	75	55	152	530

* 38 sea otters counted from shore and skiff 11/20/70.

Kamishak Bay

The Kamishak Bay area including Augustine Island, Shaw Island and Cape Douglas have been partially surveyed on numerous occasions. Lensink (1962) reported that approximately 50 otters were reported from Augustine Island in 1918 and that Spencer counted 40 at Augustine Island and one at Shaw Island in 1957. Lensink counted 52 on Augustine in 1959, but he considered it a poor count. In 1965 Keynon counted 18 on Augustine Island and 101 in the Shaw Island-Cape Douglas area. In 1969 Alaska Department of Fish and Game biologists tallied 62 and 130 animals in the Augustine Island area on different counts. In 1971 again Alaska Department of Fish and Game biologists counted 150 otters between Augustine Island and Tignagvik Point. Also in 1971 Prasil counted 60 otters between Augustine and Shaw Islands.

Cape Douglas to Wide Bay

Surveys along the Alaska Peninsula have been fragmentary and most of those made were done under less than ideal conditions. There are a number of reasons for this. Weather tends to be poor along the south shore where squalls form along the mountains. Areas where an aircraft can refuel are north of the mountains and there are relatively few passes, therefore range of the aircraft is a problem.

Small numbers of otters appear to have expanded around Cape Douglas from the Kamishak Bay population. Scattered individuals have been reported throughout the area but the main concentration occurs in the vicinity of Shakun Rock where 71 were recorded. Prasil (1971) recorded up to 443 on subsequent surveys of the area.

Kodiak Archipelago

Portions of the Kodiak area, including the Barren Islands, Shuyak Island, Afognak Island, the Trinity Islands and Chirikof Island, have good sea otter habitat although some of the area is undoubtedly of poor quality. Kodiak was an important hunting area during the Russian exploitation, but the population was never completely wiped out. Today, a relatively large population exists at the north end of the group around Afognak, Shuyak and the Barren Islands.

In 1948 refuge manager Beals reported three otters off Shuyak island and in 1951 Chapados and Spencer saw 15 on Sea Otter Island and 67 at Latax Rocks (Lensink 1960). In 1957 Lensink saw 14 in the Trinity Islands and 281 around Shuyak area. In 1964 Ed Klinkhart counted 63 sea otters at Latax rocks, 13 at Seal Island and one at Marmot Island. Most recently 15 were sighted off the south end of Marmot Island in July 1975. A partial survey of Afognak Island in October 1975 (Afognak Bay to Paramanof Bay) totaled 1,939 otters. Concentrations occurred at the north end of Marmot Island, Seal Bay and Perenosa Bay.

Sightings at areas other than the north and south ends include five sighted by James Faro at Uyak Bay and three near the south end of Chirikof sighted by the crew of the "Teal" and most recently, 10 otters sighted by Ben Ballenger in April 1975 just off Outlet Cape south of Raspberry Island.

Much of Kodiak Island contains only marginal sea otter habitat; however the population will increase as otters move into those areas that are suitable. A smaller population of unknown size occupies the shallow waters near the Trinity Islands and Chirikof Island.

This population should continue to increase. The total population of the Kodiak-Afognak-Barren Island area probably exceeds 4,000.

WHALES

Miscellaneous observations on cetaceans are included here only to indicate their presence and possible relative abundance. In most cases, there is no more information than a collection of sightings; no population estimates can be made, nor can distribution be clearly defined.

Beluga or White Whale (Delphinapterus leucas)

The beluga is a common inhabitant of the waters of Cook Inlet. There is, however, a dearth of factual biological information on the animals. Belugas have been studied in Alaska since 1954, but these investigations have dealt primarily with food habits and with methods of controlling depredations on commercially valuable salmon in the Bristol Bay area. Knowledge on life history and ecology in Alaska is incomplete.

Belugas generally resemble cigars, with one end blunt and the other tapered. The rounded head has a thick cushion of fat and flesh over the forehead; the body continues to swell as far as the flippers, and from this point gradually diminishes to the horizontal flukes. Newborn belugas are almost six feet long; adult females may reach 13 feet in length ; adult males grow to nearly 16 feet. Belugas are dark blue-gray at birth, becoming light gray and finally white at 4 to 5 years of age. This color change is caused by the loss of pigment in the skin.

In Alaska, belugas commonly occur from Cook Inlet westward to Bristol Bay, northward along the Alaskan coast, and eastward into arctic Canada. The Bristol Bay population appears to be resident

throughout the year. Movements of the Cook Inlet population in winter are not known. In the waters of the northern Bering Sea and the Arctic Ocean, belugas move with free ice or leads in pack ice. It is believed that the Bering Sea is the wintering area of belugas frequenting the western Canadian arctic and the eastern Siberian arctic, as well as for those remaining in Alaskan waters (Brooks, 1954a).

There is little basis for establishment of total numbers of belugas in Cook Inlet. Aerial surveys made by Klinkhart in 1963 and 1964 indicated a summer population of 300 to 400 animals.

Over much of their Alaskan range, belugas enter estuaries in summer as soon as ice moves offshore. The entering of estuaries may be the result of concentrations of smelt or other fish which are ascending rivers from the sea.

The diet of belugas during the spring and summer months is probably the best known aspect of beluga biology in Alaska. In 1954, the then Alaska Department of Fisheries initiated a program to determine if the beluga was a competitor with man for commercially valuable salmon in the Bristol Bay area.

The belugas examined by Brooks (1954a, 1955, 1956, 1957) contained 5 species of salmon as well as smelt, flounder, sole, sculpin, blenny, lamprey, two types of shrimp, and mussels. Since this study was conducted during the summer months (May to August), it is possible that a greater number of food species enter the beluga's diet at other times of the year (Brooks, 1954a).

It is uncertain whether belugas were ever harvested commercially in Alaska. Whaling stations operated at Port Armstrong, Port Hobron and at Akutan Island, prior to 1940, but the Alaskan Fishery and Fur Seal Industries Reports make no mention of belugas being a part of the whale harvest.

Personal conversation with a long-time Anchorage resident revealed that an attempt to harvest Cook Inlet belugas was made in the 1930's. About 100 belugas were netted in the Beluga River for meat and oil. After the initial catch, no animals returned to the river and the venture was abandoned.

Sport hunting for belugas has developed in the Cook Inlet area. Several Alaskan guides have said, "hunting the beluga whale is by far the most exciting big game hunting ever done." (Anonymous, 1965.) Hunters, equipped with an open dory, harpoons and high powered rifles, herd the whales into shallow water where the animals are harpooned and shot.

Pacific Right Whale or Black Right Whale (*Balaena glacialis*)

This large whale was hunted to near extinction in the North Pacific and was most frequently found in the Gulf of Alaska in the summer months. Little is known about their present distribution and abundance except they are considered rare. (Leatherwood et al 1972)

Gray Whale (*Eschrichtius robustus*)

Gray whales are known to migrate through the Gulf of Alaska in the spring from May through November to feed in the waters of the Bering and Chukchi Seas. In December and January, they return to breed in shallow waters of California and Mexico. (Leatherwood et al 1972.) The National Marine Fisheries Service reports sightings of gray whales between the Fairweather Grounds and Yakutat Bay in April, 1958.

Minke Whale (Balaenoptera acutorostrata)

Minke (pronounced minky) whales, also known as little piked whales or sharp-headed finners; are the smallest of the baleen whales in the northern hemisphere, reaching a length of approximately 33 feet. They are grayish black on the back and white on the belly and on the underside of the flukes and flippers. Each of the flippers has a very distinct horizontal band of white. The baleen, which may be visible from a short distance away when the animal is feeding, is coarse, less than one foot long, and either yellow or white.

When viewed from above, the snout of the minke is distinctly triangular, similar to but sharper than that of the finback. The animal's blow is low and barely visible. The dorsal fin is relatively large and falcate and is usually exposed as the animal rolls through the water to breathe. The flukes are seldom raised when the animal is beginning a dive.

Minke whales are frequently solitary animals though they may congregate in areas of food concentration in northern seas during the spring and summer. They are more likely to be seen up close than their larger cousins (blue, fin and sei) or than the giant bottlenose whales because they frequently come very close to boats, as if curious about them.

Minkes feed primarily on small shoal fish (cod, pollack and capelin) and may approach very close to shore pursuing these.

Minke whales are relatively common throughout the Gulf of Alaska and are known to concentrate in areas of abundant food such as the Kodiak Island area and Prince William Sound. They are migratory, moving into the Gulf of Alaska in spring and returning south in the fall. The minke is the most common small whale in the Gulf of Alaska with pelagic fur seal investigators reporting 43 minkes at 33 locations.

Sei Whale (Balaenoptera borealis)

The range of the sei whale extends into Gulf of Alaska water although the specific distribution is poorly known (Leatherwood et al 1972). Sei whales have been reported during pelagic fur seal investigations.

Blue Whale (Balaenoptera musculus)

Blue whales are found in the Gulf of Alaska from May through September according to Leatherwood et al 1972. Pelagic fur seal investigations of the National Marine Fisheries Service recorded seven blue whales sighted from 1958 through 1968. Blue whales are considered endangered and near extinction.

Humpback Whale (Megaptera novaeangliae)

Humpback whales are the most common of the large whales with dorsal fins in the Gulf of Alaska and according to Leatherwood et. al. (1972) can be seen in virtually any part of their range in the summer, which includes all of the Gulf of Alaska. National Marine Fisheries Service pelagic fur seal investigators have sighted 132 humpbacks on 64 different occasions in the Gulf of Alaska.

North Pacific White Sided Dolphin (Lagenorhynchus obliquidens)

North Pacific white sided dolphins or lags are found from Alaska to Baja, California according to Leatherwood et al (1972) but sightings are not common in the Gulf of Alaska. One sighting of 2,000+ lags was recorded by National Marine Fisheries Service pelagic fur seal investigators at latitude 57° 34', longitude 140° 33' and a sighting of 12 lags was recorded during the cruise of the OCEANOGRAPHER. These lags were recorded as being near the 1,000 fathom curve off Yakutat Bay.

Killer Whale (Orcinus orca)

The most distinctive field characteristic of the killer whale is the very prominent dorsal fin, which may be as much as six feet tall and extremely erect in adult males. Though the dorsal fin of females and immature animals is less than three feet tall and slightly back-curved, it is nonetheless taller even in these animals than in any other cetacean species.

Killer whales are the largest members of the dolphin family. Adult males reach a length of over 25 feet (lengths of 31 feet are recorded for the western North Pacific). Females are slightly smaller. At birth, young are approximately seven to eight feet long. Both sexes are heavily-bodied and have large paddle-shaped flippers.

They are basically black but have an extensive region of white on the undersides extending from the lower jaw to the anal region, with a branch extending onto the flank behind the dorsal fin. There is an oval white patch on the side of the head just above and behind the eye, and a light gray saddle marking just behind the dorsal fin. The undersides of the flukes are white. Both all-black and all-white animals have been reported (one albino was captured in B.C. in 1970) but these are unusual.

Killer whales usually travel in groups of from a few to 25 or 30 individuals, though herds of more than 50 have been reported from Puget Sound.

Killer whales feed on large fishes and other marine mammals (seals, sea lions and porpoises and whales).

Killer whales are found throughout the Gulf of Alaska during the summer months and may shift to the south in the winter (Leatherwood 1972). A total of 36 killer whales were sighted by National

Marine Fisheries pelagic fur seal investigators on nine different occasions in the Gulf of Alaska. National Marine Fisheries Service special agent Jim Branson reported seeing 500+ killer whales near Middleton Island on April 24, 1973.

Harbor Porpoise (Phocoena phocoena)

The harbor porpoise, also known as the Gulf of California propoise, is the smallest cetacean in the eastern North Pacific, reaching a maximum length of about five feet. It is characterized by a rather small triangular dorsal fin and a chunky body with a rounded head and an extremely small indistinct beak. Its body is dark gray above and white below with a transitional speckled zone on the sides.

As the name implies, the harbor porpoise inhabits bays, harbors, river mouths and relatively shallow inshore waters. Though it may travel in schools of nearly a hundred individuals, it is more often seen in pairs or in small groups of from five to ten individuals. It swims quietly at the surface. It will not ride the bow wave and is very difficult to approach closely by boat.

The harbor porpoise is the smallest cetacean in the Gulf of Alaska and can often be seen in the bays and harbors throughout the Gulf of Alaska according to Leatherwood et. al. (1972). Pelagic fur seal investigators report a total of 176 animals sighted at 17 locations between 1958 and 1968.

Dall Porpoise (Phocoena dalli)

Dall's porpoise is a distinctively marked cold water species which may be readily identified on the bow of a vessel by several characteristics: (1) the prominent white patch on the flanks and belly which extends from about midway on the body nearly to the tail flukes, (2) the white markings on the dorsal fin and on the upper trailing edge of the flukes, and (3) the overall body shape, particularly the head and the very robust midsection, which is very unlike that of any other animal in the eastern Pacific. In addition, there is a prominent keel on the top and the bottom of the tail. As it rides the bow, Dall's porpoise moves very quickly and jerkily, darting in and out of the bow wave with amazing quickness.

Even when it does not come in to ride a moving vessel's bow wave, however, Dall's porpoises are a thrill to see and may be easily identified. It does not jump clear of the water, but when it is making a high speed run, as when it is attempting to overtake or avoid a boat, or when it is feeding, its entire body may be obscured by the "rooster tail" or spray it puts out from its head as it surfaces to breathe. Dall's porpoise reaches a length of over seven feet, and though it normally travels in small groups (2-15) in Southern California waters, herds of over 500 have been reported from the Alaskan Coast. They are sometimes found with Pacific white-sided dolphins and at least in the area of the Northern California Channel Islands are often seen in small groups near Pacific pilot whales.

The Dall porpoise is probably the most common cetacean seen in Gulf of Alaska waters with sightings common both near shore and offshore. A total of 1,912 Dalls were sighted on 289 occasions during pelagic fur seal investigations between 1958 and 1968 by National Marine Fisheries personnel.

Sperm Whale (Physeter catodon)

Leatherwood et al (1972) considers the sperm whale migratory, being found in the Gulf of Alaska in the summer months. National Marine Fisheries pelagic fur seal investigators list sightings of 19 sperm whales on nine occasions.

Pelagic catches of whales in the Gulf of Alaska by Japan and Russia have been recorded by the National Marine Fisheries Service and are shown in the following table. This reflects the total catch of whales by these two nations in all Gulf of Alaska waters, including areas south of Cape Spencer.

Pelagic catches of whales in the Gulf of Alaska by the USSR and Japan.

1965-1974

Year	Blue	Humpback	Fin	Sei	Sperm
1965	68	106	1118	816	1344
1966	<u>1</u> /	<u>1</u> /	833	1174	1009
1967	<u>1</u> /	<u>1</u> /	101	145	1137
1968	<u>1</u> /	<u>1</u> /	35	239	356
1969	<u>1</u> /	<u>1</u> /	11	49	538
1970	<u>1</u> /	<u>1</u> /	115	119	180
1971	<u>1</u> /	<u>1</u> /	59	100	138
1972	<u>1</u> /	<u>1</u> /	4	15	311
1973	<u>1</u> /	<u>1</u> /	4	8	171
1974	<u>1</u> /	<u>1</u> /	88	10	307

1) Completely protected from 1966 on.

MARINE MAMMALS REFERENCES

- Alaska Department of Fish and Game. 1964. Hair seal status report. Unpub. report. 7pp.
- _____. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 143pp. + 563 maps.
- Anonymous. 1965. Beluga offer top big game. Anchorage Daily Times. July 1, 1965.
- Bigg, M.A. 1969. The harbor seal in British Columbia. Fish Res. Bd. Can. Bull. 172. 33pp.
- Bishop, R.H. 1967. Reproduction, age determination and behavior of the harbor seal, Phoca vitulina L., in the Gulf of Alaska. MSc. Thesis. Univ. of Alaska, College, Alaska. 120pp.
- Brooks, J.W. 1954a. Preliminary report on beluga investigations in Bristol Bay. Unpub. data.
- _____. 1954b. Annual report, Alaska Dept. Fisheries 6:51-57.
- _____. 1955. Annual report, Alaska Dept. Fisheries 7:98-106.
- _____. 1956. Annual report, Alaska Dept. Fisheries 8:54-56.
- _____. 1957. Annual report, Alaska Dept. Fisheries 9:57-58.
- Calkins, D.G., K.W. Pitcher and K. Schneider. 1975. Distribution and abundance of marine mammals in the Gulf of Alaska. Alaska Dept. of Fish and Game. Unpub. report, 67pp.
- Kenyon, K.W. 1969. The sea otter in the eastern Pacific Ocean. N. Amer. fauna no. 68: U.S. Government printing office, Washington, D.C. 352pp.
- Klinkhart, E.G. 1966. The beluga whale in Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Wildl. Rest. Vol. VII. Proj. W-6-R and W-14-R. 11pp.
- Leatherwood, S., W.E. Evans and D.W. Rice. 1972. The whales, dolphins and porpoises of the eastern North Pacific, a guide to their identification in the water. NUC TP 282, 175p. Not for sale. Can be obtained through MMD.
- Lensink, C.J. 1960. Status and distribution of sea otters in Alaska. Jour. Mamm. 41; 172-182.
- _____. 1962. The history and status of sea otters in Alaska. Ph.d. Thesis. Purdue Univ., Lafayette, Ind. 188pp.

- Mathisen, D.A. and R.J. Lopp. 1963. Photographic census of the Steller sea lion herds in Alaska, 1956-1958. U.S. Fish and Wild. Serv. Spec. Sci. Bull. #424. 17pp.
- Pitcher, K.W. 1975. Distribution and abundance of sea otters, Steller sea lions and harbor seals in Prince William Sound, Alaska. Alaska Dept. of Fish and Game. Unpub. report. 31pp.
- Prasil, R.G. 1971. Distribution of sea mammals and associated land mammals found along the Katmai Nat'l. Monument. Proceedings 22, Ak. Sci. Conf., College, Alaska.
- Sandegren, F.E. 1970. Breeding and maternal behavior of the Steller sea lion (Eumetopias jubatus) in Alaska. MSc. Thesis. Univ. of Ak., College, Ak. 138pp.
- Spalding, D.J. 1964. Comparative feeding habits of the fur seal, sea lion and harbor seal on the British Columbia coast. Fish. Res. Bd. Can. Bull. 146. 52p.
- Vania, J. 1967. Sea lion. In marine mammal investigations. Alaska Dept. of Fish and Game; Vol. IX. Annual project segment report, Fed. Aid. in Wild. Restoration. Proj. W-14-R-2 and 3, work plan G.
- _____. 1968. Sea lion. In marine mammal investigations. Alaska Dept. of Fish and Game; Vol. X. Annual proj. segment report, Fed. Aid in Wild. Restoration. Proj. W-14-R-3 and W-17-1, work plan G.
- _____. 1971. In annual report of survey-inventory activities. Part II. Alaska Dept. of Fish and Game. Fed. Aid in Wild. Rest. Proj. W-17-4.

WATERFOWL RECREATION AND SUBSISTENCE USE

Waterfowl Sport Hunting

Waterfowl sport hunting statistics in Alaska are generated from a combination of two sources. Total duck harvest, number of hunter days, snipe and crane harvest and goose harvest by species is calculated from an annual mail survey of ten percent of all licensed buyers in Alaska. Duck species composition information are derived from the U.S. Fish and Wildlife Survey where hunters send in duck wings.

Sport hunting in Cook Inlet represents the greatest concentration of duck hunters and consequently duck harvest of any area in Alaska. The combination of a large number of local residents around Cook Inlet and abundance of coastal saltwater marshes and intertidal lands are responsible for the large amount of hunting which occurs here.

A much smaller amount of hunting and harvest occurs on Kodiak due to the lesser number of people living on the island. On Kodiak however, two areas of hunter concentration are Kalsin and Middle Bays. These are on the short road system out of town and receive most of the hunting pressure from Kodiak city residents. All of the good hunting areas around Cook Inlet can be in many cases reached by private automobile on the road systems or by a short airplane trip.

The average seasonal take per active duck hunter in the Cook Inlet area is about seven ducks per season. However, the average take by a hunter on Kodiak amounts to over ten ducks per season. Kodiak duck hunters experience the highest average seasonal success of any other hunters in Alaska. About one half of the ducks bagged by Kodiak hunters are non-game species. Non-game ducks constitute a small (about five

percent) portion of the hunters' bags in the Cook Inlet area. Non-game species are scoters, eiders, harlequins and old squaws. Many of these species are quite abundant around Kodiak, especially later in the season when some excellent hunting for these birds is available. Relatively few of these species are available near the major hunting areas in Cook Inlet.

In Table 1, the sport hunting statistics for Cook Inlet, Kodiak and for the entire State of Alaska are given for the past four years. Waterfowl sport hunters in the Cook Inlet area annually spend nearly 35% of the total hunting days in Alaska and take about 38% of the duck harvest and 14% of the annual goose harvest. Hunters on Kodiak annually contribute about 3.5% of the State's total hunter days, and 4% of the annual duck harvest, but less than 1% of the annual goose harvest. In total, Cook Inlet and Kodiak hunters annually combine to represent about 40% of the State's total hunter days and duck harvest, while they take about 14% of the annual goose harvest. Although not depicted in Table 1, many hunters who reside in the Cook Inlet area and on Kodiak annually travel to the north side of the Alaska Peninsula for goose hunting trips. Harvest and hunter days represented in Table 1 is therefore only that which occurs in the respective geographic areas.

In the Cook Inlet area over 85% of the duck harvest is comprised of mallards, pintails, american widgeon, greenwinged teal, and shovelers. These same six species represent nearly half of the annual duck harvest on Kodiak.

As can be seen from Table 1, goose harvest on Kodiak-Afognak Island is not large. Very few geese stop on these islands on their way south in the fall. About 2,000 emperor geese annually overwinter on the

TABLE 1. Sport Hunting Statistics, Cook Inlet, Kodiak and Statewide.

1971-74 Four Year Average Per Year Statistics	Cook Inlet	Kodiak	Total Kodiak & Cook Inlet	Statewide Totals
Hunter Days	18,500	1,910	20,410	53,500
Ducks Shot	32,000	3,100	35,100	83,370
Geese ^{1/}				
Canada	1,640	0	1,640	9,730
Emperor	0	40	40	2,095
White-fronted	150	0	150	840
Brant	10	10	20	1,140
Snow	50	0	50	370
Total Geese	1,850	50	1,900	14,175
Cranes shot	95	0	95	620
Snipe shot	895	220	1,115	14,175

^{1/} 1972-74 3 year average

southern part of Kodiak Island, but few hunters go to this area for waterfowl hunting.

Table 2 shows the waterfowl sport hunting statistics by major hunting location in Cook Inlet and on Kodiak. Susitna Flats and Palmer Hay Flats are the two major hunting areas in Cook Inlet and annually rank among the top three for total hunter days and duck harvest in Alaska. Waterfowl harvest data and hunter days which occur on the areas in Table 2 must be considered minimum. Many hunters in Anchorage hunt on Susitna Flats for example, but do not indicate on the mail survey form that they hunted there. These hunters are put in an unknown category within the Cook Inlet region where they reside. Actual duck harvest and hunter days on most of these areas could in actuality be increased by about 10%.

It is estimated that waterfowl hunters on Kodiak spend an average of \$47,750 per year in pursuit of their sport. The meat from the birds which they harvest is calculated to value \$10,200 for a total of \$57,950 on Kodiak. In the Cook Inlet area it is estimated that duck hunters on the average spend annually \$832,500 to hunt waterfowl. The birds which they harvest are worth \$236,950 in meat value for a combined total of \$1,069,450. Combining meat values and dollars spent waterfowl hunting in both areas it is estimated that a total of \$1,127,400 is the amount which waterfowl hunting is "worth" in these two areas. This amounts to 45.8 %of the total dollars generated for Alaska.*

Nonconsumptive Recreational Use

Nonconsumptive human recreational use of waterfowl and seabirds or

*Alaska Department of Fish and Game, 1976. A compilation of Fish and Wildlife Resource Information for the State of Alaska. Vol. I - Wildlife.

TABLE 2. Waterfowl sport hunting statistics by major hunting location,
Cook Inlet-Kodiak.

1971-1974; Four Year Average	Specific Location				
	Susitna Flats	Palmer Hay Flats	Potter Marsh	Kachemak Bay	Trading Bay
Hunter Days	4,465	3,950	885	975	645
Ducks Shot	10,070	6,290	1,050	2,260	1,620
Geese Shot ^{1/}	520	165	5	230	185

^{1/} 1972-1974; three year average

1971-1974; Four Year Average	Eagle River	Chickaloon	Portage	Redoubt Bay	Goose Bay
Hunter Days	1,185	955	800	200	500
Ducks Shot	1,160	1,705	600	525	1,000
Geese Shot ^{1/}	10	520	25	25	10

^{1/} 1972-1973; three year average

any wildlife is a very difficult thing to quantify under most circumstances. Under highly controlled situations such as National Parks, visitor days can be measured and outdoor activities evaluated by questionnaires. In the Cook Inlet-Kodiak area, only descriptions of the nonconsumptive values can be provided.

Possibly the single most heavily used area in the Cook Inlet-Kodiak area is Potter Marsh, near Anchorage. The Seward Highway which runs through a portion of the marsh provides access to excellent waterfowl viewing, photography opportunities, and other nonconsumptive uses of waterfowl. A portion of Potter Marsh which adjoins the Seward Highway has been closed to waterfowl hunting to facilitate viewing. It is estimated that annually over 10,000 people purposely visit Potter Marsh to view and photograph waterfowl and other birds. This area also serves as an excellent outdoor classroom for the numerous schools and other nature students in Anchorage.

The Palmer Hay Flats and Matanuska Valley around Palmer are also a popular viewing area, especially in the spring. Duck and goose numbers in this area peak at something over 100,000 birds during a one to two week period each spring. Many of these birds use green fields in the Matanuska Valley and areas having shallow water. Perhaps 5-10,000 or more people annually visit these areas to view and photograph waterfowl.

The Portage area located near the mouths of Portage Creek, Twenty-Mile River and Placer Creek also receive heavy nonconsumptive recreational use. This area is a popular one for outside tourists, as well as local residents. Possibly five thousand people annually visit the Portage area to view and photograph birds, however, the major nonconsumptive use is made by people traveling on the Seward Highway and viewing birds incidental to their travel. The Alaska Department of Fish and Game is

cooperating with the Bureau of Land Management in a habitat enhancement program on the Portage area which will facilitate nonconsumptive as well as consumptive use.

Much incidental viewing of waterfowl also occurs on the Seward Highway between Anchorage and Homer. Many lakes and ponds along this highway have a few ducks, loons, gulls, etc. and some degree of enjoyment is experienced by many people viewing these birds while traveling on the road.

Good viewing opportunities are available at the town of Homer. Because the Homer Spit extends several miles into Kachemak Bay a variety of waterfowl, shorebirds and seabirds can be seen and photographed from the spit. Boat tours are also available. These are used primarily by outside visitors to take them through Kachemak Bay where a variety of waterfowl and seabirds are present and are readily seen.

Incidental viewing of waterfowl occurs throughout the Cook Inlet area. For example, large numbers of ducks, geese and swans can be seen at various times of the year by people traveling in aircraft in this area. The value of such observations is difficult to determine, but the presence of numerous birds, or in some cases just one swan, undoubtedly adds something to the experience of traveling in the Cook Inlet region.

On Kodiak Island the majority of purposeful nonconsumptive bird viewing is done from the road system out of Kodiak. Because the road traverses a number of habitat types (salt marsh, tidelands, rocky shores and beaches) a variety of waterfowl, seabirds and other birds can be seen. One of the major recreational pastimes in Kodiak is to get out on a nice day, regardless of the time of year, and drive the road system. The presence of sometimes large numbers and always a variety of birds available undoubtedly adds to the pleasantness of the drive "out the road."

Much incidental viewing and photography of seabirds also occurs by the many boat and aircraft travelers around Kodiak and Afognak Islands. Travellers on the State Ferry system going in and out of Kodiak can frequently see large numbers of seabirds on trips between Seward and Kodiak.

In aggregate the nonconsumptive use of waterfowl and other birds in both the Cook Inlet and Kodiak areas far exceeds the use by waterfowl hunters. However, the Alaska Department of Fish and Game believes these two uses are entirely compatible and will try to provide for both uses where conflicts might occur.

Subsistence Use

Subsistence hunting (that occurring outside of the legal season dates) is not believed to be either extensive or occurring in great magnitude in any location throughout the Cook Inlet-Kodiak Region. Probably the only area where subsistence hunting occurs to any degree is around the small villages located on Kodiak-Afognak Islands. However, this subsistence hunting is not believed to be great and it certainly has not adversely affected the welfare of any population or species of waterfowl or other birds.

WATERFOWL PRODUCTION

Cook Inlet Coastal Marshes

Since the mid 1950's the U.S. Fish and Wildlife Service has been conducting estimates of the breeding duck populations in Alaska. They annually fly some one hundred hours over flight lines that cover most of the major duck breeding habitat in the State. The paths flown are the

same each year so that estimates of breeding ducks are comparable and lend themselves to long term average estimates. Most of the aerial surveys done in the Cook Inlet area are conducted over upland (above 600 feet MSL).

In 1975 the Department of Fish and Game initiated a series of breeding waterfowl surveys which are identical to those used by the Fish and Wildlife Service. These surveys have been conducted over the coastal marshes in Cook Inlet in an attempt to better document waterfowl nesting and production which is occurring in these areas. Maps depict the areas surveyed. Land within the heavy outlying border on each area is that habitat which estimates of nesting waterfowl are made. The numbered transverse lines across each area are the survey flight lines. Ducks are counted on one-eighth of a mile either side of the aircraft along these lines.

In Table 3 the results of these aerial surveys are shown. The number of birds by species which are calculated to occur on each area are presented as well as what proportion of the total duck population each species represents. At the bottom of Table 3 are the calculated populations of swans, geese, cranes and loons by area.

In Table 4 the size of each area in square miles is listed. Also shown in Table 4 are the square mile densities of nesting ducks located on each area. The Jim-Swan Lake area, Portage Flats, and Trading Bay areas each have over 100 breeding ducks per square mile. These nesting duck densities exceed densities in other areas of Alaska. The Yukon Flats which has over 10,000 square miles of habitat has about 100 ducks per square mile. However, the calculated populations in both Table 3 and 4 represent in some cases only one year and at the most two

TABLE 3. Calculated breeding bird populations on coastal Cook Inlet marshes and on the Jim Swan Lakes area.

	Palmer Hay 1/		Goose Bay 1/		Susitna 1/		Chickaloon 1/		Portage Area 2/	
	No.	% of Total	No.	%	No.	%	No.	%	No.	%
Pintail	850	32	108	20	5,268	49	542	46	567	25
G-W Teal	109	4	234	42	1,756	16	296	25	522	23
Mallard	488	18	116	21	1,043	10	74	6	637	28
Am. Widgeon	144	5	-	-	759	7	234	20	67	3
Shoveler	451	17	60	11	436	4	-	-	70	3
Gadwall	77	3	-	-	108	1	39	3	-	-
Total Dabbler	2,119	79	518	94	9,370	87	1,185	100	1,863	82
Scaups	267	10	12	2	883	8	-	-	24	1
Goldeneyes	235	9	17	3	250	2	-	-	268	12
Mergansers	-	-	6	1	68	1	-	-	104	5
Bufflehead	-	-	-	-	27	1	-	-	-	-
Canvasback	50	2	-	-	85	1	-	-	-	-
Scoters	-	-	-	-	-	-	-	-	-	-
Total Divers	552	21	35	6	1,313	13	0	0	396	18
Total Ducks	2,671	100	553	100	10,683	100	1,185	100	2,259	100
Swan	5	-	-	-	68	-	-	-	12	-
Canada Goose	211	-	14	-	1,110	-	55	-	9	-
White-fronted Goose	-	-	-	-	-	-	-	-	-	-
Sandhill Crane	22	-	12	-	23	-	15	-	-	-
Common Loon	42	-	12	-	-	-	-	-	12	-
Red-throated Loon	-	-	-	-	17	-	-	-	-	-
Arctic Loon	-	-	4	-	17	-	-	-	-	-

1/ 1975-76 two year average
2/ 1976 only

TABLE 3 (CONT'D.). Calculated breeding bird populations on coastal Cook Inlet marshes and on the Jim Swan Lake area.

Species	Trading Bay 2/		Redoubt Bay 2/		Fox River Flats 2/		Jim Swan Area 1/		Total Except Jim Swan	
	No.	% of Total	No.	%	No.	%	No.	%	No.	%
Pintail	4,890	45	6,015	33	150	20	504	27	18,390	39
G-W Teal	2,750	25	6,468	35	158	20	89	5	12,293	26
Mallard	471	5	2,458	13	69	9	345	18	5,356	11
Am. Widgeon	1,209	11	1,110	6	61	8	481	25	3,584	8
Shoveler	578	5	-	-	-	-	-	-	1,595	3
Gadwall	107	1	205	1	-	-	-	-	536	1
Total Dabbler	10,005	92	16,256	88	438	57	1,419	75	41,754	88
Scaups	374	4	1,100	6	-	-	256	13	2,660	6
Goldeneyes	235	2	711	4	183	24	128	7	1,899	4
Mergansers	214	2	474	2	144	19	-	-	1,010	2
Bufflehead	-	-	-	-	-	-	12	1	27	Tr
Canvasback	-	-	-	-	-	-	51	3	135	Tr
Scoters	-	-	-	-	-	-	18	1	18	Tr
Total Divers	823	8	2,285	12	327	43	465	25	5,749	12
Total Ducks	10,828	100	18,541	100	765	100	1,884	100	47,503	100
Swan	21		356		-		4		462	
Canada Goose	-		-		-		-		1,399	
White-fronted Goose	289		172		-		-		461	
Sandhill Crane	642		86		-		-		800	
Common Loon	86		-		-		-		152	
Red-throated Loon	385		43		-		-		445	
Arctic Loon	-		-		-		-		21	

1/ 1975-76 two year average

2/ 1976 only

TABLE 4. Total land area and breeding ducks per square mile of habitat on coastal marshes in Cook Inlet and the Jim Swan Lakes area.

Area	Size in Mi. ²	Birds per mi. ²		
		Dabblers	Divers	Total Ducks
Redoubt Bay	248.0	65.6	9.2	74.7
Susitna Flats	136.0	68.9	9.7	78.6
Trading Bay	107.0	93.5	7.7	101.2
Palmer-Hay Flats	42.7	49.6	12.9	62.5
Chickaloon Flats	39.0	30.4	0	30.4
Portage Area Flats	18.3	101.8	21.6	123.4
Fox River Flats	16.6	26.4	19.7	46.1
Goose Bay	9.2	56.3	3.8	60.1
Total Cook Inlet Marshes	616.8	67.7	9.3	77.0
Jim Swan Area	14.0	101.4	33.2	134.6

years of survey information. These are, however, our best estimates of nesting duck numbers on Cook Inlet marshes. The average of 77 ducks per square mile on all Cook Inlet marshes exceeds nesting duck densities on almost all other breeding habitat in Alaska.

Good estimates of waterfowl produced on these areas are unavailable. However, a reasonable assumption for Cook Inlet is that dabblers produce one duckling for each adult bird present and divers produce 0.8 ducklings for each adult bird present. If this assumption is true, then total duckling production on Cook Inlet marshes exceeds 46,350 birds yearly. Duckling production and total fall flight can be calculated for individual areas listed in Table 3 by using the 1.0 and 0.8 figures for dabblers and divers respectively.

Duck Production On Cook Inlet Uplands

About 2,000 square miles of upland Cook Inlet waterfowl production habitat exists. Using U. S. Fish and Wildlife estimates (see 1971 USFWS Report by J. G. King and C. J. Lensink, An Evaluation of Alaskan Habitat for Migratory Birds) a total calculated duck breeding population of 24,700 birds is annually present in this area. They estimate that 13,500 dabblers, 9,400 divers, and 1,800 nongame ducks occur on these uplands. This amounts to a breeding duck density of 12.4 birds per square mile. Using production figures of 1.0, 0.8, and 0.6, for dabblers, divers and nongame species, respectively, a total duckling production of 22,100 birds is indicated. The value of near coastal Cook Inlet marshes to waterfowl production is easily seen by considering that over twice as many ducks are produced here on slightly over 600 square miles of habitat than on about 2,000 square miles of surrounding upland habitat.

Other Production Areas

Definitive surveys of ducks and other waterfowl produced in other areas of this region have not been conducted because duck production is minimal. However, a substantial but unmeasured number of birds are produced on Kodiak Island. On Kodiak Island 10-20,000 ducklings of the game species are annually produced at the heads of small bays and along habitat bordering streams and rivers. Duckling production by nongame species such as harlequins and mergansers is undoubtedly substantial on Kodiak and other areas within the Kodiak-Cook Inlet region. Because most of these groups nest in obscure isolated places such as wooded streams and rivers, even a guess of the number of birds present or produced is impossible.

Goose Production

Before the 1964 earthquake very few Canada geese existed in Cook Inlet. However, since the earthquake-apparently in response to habitat change-a mushrooming population of lesser Canadas has become established. A July 1974 survey in Cook Inlet showed a population in excess of 2,000 birds (see Table 3 for relative distribution by area). Although unconfirmed, these geese probably nest some distance back from saltwater in the low, brushy areas. Flocks of nonbreeding geese are conspicuous and spend the summer closer to saltwater and frequent tide influenced streams and rivers. Initial but limited morphology and banding studies on these geese in the Anchorage area indicates they are Parvipes sp. and are wintering in Oregon's Willamette Valley along with dusky Canada geese from the Copper River Delta near Cordova.

A small population of geese, numbering about 1,000, are present during the summer in the Trading Bay and Redoubt Bay areas. These birds

generally occur several miles from saltwater and inhabit small ponds and lakes. Although unconfirmed, the production of goslings probably occurs in this area. However, the bulk of the population appears to be non-breeding adults or sub adult white fronted geese.

In 1973, 13 Vancouver Canada geese from Southeast Alaska were shipped to Kodiak. These birds were held in captivity for several months and then released. It was anticipated that this group of birds would be the first of a series of releases of Vancouver geese designed to create a resident, nonmigratory population of Canada Geese on Kodiak Island. However, since then the Fish and Wildlife Service policy has been to not sanction this project until the determination of what species of Canada goose is nesting in Prince William Sound is made. With this determination a better indication of whether Vancouvers from Southeast or the Canadas from Prince William Sound should be transplanted to Kodiak. Should the transplant project eventually proceed, the people on Kodiak-Afognak islands could have an additional waterfowl resource available for both nonconsumptive and consumptive users. Although unconfirmed, we do not believe any of the original 13 Canada geese have successfully nested and reared young, although a few of the birds can still be occasionally seen around Kodiak.

Swans

Trumpeter swans are associated with interior, forested habitat while whistling swans occur primarily on coastal tundra areas. Swans in the Cook Inlet-Kenai Peninsula area are the trumpeter species while the few swans which nest on Kodiak are whistlers.

There have been two nearly complete inventories of trumpeter swans in Alaska, in 1968 and in 1975. Both surveys were conducted in late

August and early September by personnel of the U.S. Fish and Wildlife Service. Survey data from the 1975 survey are not yet available. Eventually swans seen by location will be provided on 1:63,360 scale maps and compared to 1960 observations. Also, observations by specific location in 1968 are not readily available but totals by regional areas of observation are. On the western side of the Kenai Peninsula (upland, but generally below six hundred feet MSL) 181 swans were seen in 1968.

There were 21 pairs of swans in this total and an aggregate of 65 young birds. Apparently the Kenai Peninsula population has stabilized since 1968 as the 1975 count showed about the same number of birds present (J. G. King, pers. comm.). On the west side of Cook Inlet from Redoubt Bay west to the Alaska Mountain Range and north, 1,022 trumpeter swans were observed in 1968. However, this figure represents swans seen north of Willow to Talkeetna, but the proportion of birds very probably represents little more than 10 % of the total population. These birds were composed of 91 adult pairs and in aggregate they had 362 young birds. The number of birds observed in the same area in 1975 is substantially above what was seen in 1968 (J. King, pers. comm.). Apparently either a population increase on the west side of Cook Inlet has occurred or birds were missed in 1968. On both the Kenai Peninsula and on the west side of the Cook Inlet most of the swan observations occurred on shallow water areas of five acres or less which were surrounded by sedge. Most observations were also made at elevations below 300 feet MSL, however, observations of swans on water areas of over 1,000 feet MSL were made.

The only swans which overwintered in the Kodiak-Cook Inlet Region are found on Kodiak Island. During the winter of 1975 an observation of 12 different swans were made on Kalsin and Middle Bays. A local bird-watcher identified these birds as whistlers and said that all birds were

adults and remained throughout the winter of 1974-75. This wintering area is quite abnormal, but these birds are probably the same birds which nested on Kodiak Island.

GENERAL WATERFOWL DISTRIBUTION

Winter

In Cook Inlet, near shore wintering waterfowl are found primarily from Kachemak Bay south, around the Kenai Peninsula and on the west side of the Inlet from Kamishak Bay south. However, a few birds can be found from Kenai south from Kamishak Bay, but these birds are limited primarily to scoters and a few eiders. Offshore populations of scoters eiders and seabirds are numerous. The largest waterfowl concentration of wintering birds in Cook Inlet is found in Kachemak Bay. However, too few winter bird surveys have been done to adequately assess the importance of lower Cook Inlet to wintering populations. A survey of Kachemak Bay, conducted in 1968, showed about 10,000 waterfowl were present during the winter. A mid-February survey in 1976 in Kachemak Bay showed about 8,000 waterfowl present (Table 7) and a total bird population of about 10,000. Table 5 shows the number of birds counted along the coastal areas and both the west and east sides of Cook Inlet during early February 1976. This survey showed a wintering bird population in lower Cook Inlet, including Kachemak Bay, of 21,071 birds of which 13,920 were waterfowl. Again this includes only nearshore bird populations. A significant, but unknown proportion of birds are missed during the aerial surveys. Table 6 also contains estimates of waterfowl found in lower Cook Inlet during early February 1971. In Table 8 the results of the waterfowl survey conducted in the third week of March 1970 in bays

along the south side of the Alaska Peninsula are shown.

Wintering birds in Cook Inlet are confined primarily to Kachemak Bay and south on the east side and south of Kamishak Bay on the west side of the inlet. This is because areas to the north have heavy shore ice during the winter and the birds cannot find adequate food and resting cover.

More surveys of wintering waterfowl have been conducted on Kodiak Island than in any other area of Alaska. However, results of the most extensive survey, which was conducted in late winter 1975, are yet unavailable. This survey sampled various portions of Kodiak and Afognak Island and relates bird population to shoreline habitat type. Results of this survey which was conducted by Department of Fish and Game personnel will be available during the early fall 1976.

In Table 9 a summary of wintering waterfowl surveys conducted since 1966 is presented. The largest number of birds occur in the bigger bays where a substantial amount of the shoreline remains ice free.

In Table 10 a summary of two winter surveys made in 1973 and 1975 by U. S. Fish and Wildlife Service personnel is presented. This survey includes all birds and encompasses most of the nearshore area adjacent to the Kodiak National Wildlife Refuge. As can be seen on Tables 9 and 10 the number of waterfowl and other birds wintering in nearshore areas around Kodiak and Afognak Island is substantial. More definitive information will be available when results of the 1976 survey are analyzed.

Spring and Fall

Unlike winter periods, extremely large concentrations of ducks, geese, swans, and other birds occur during the spring and fall in some areas in the northern part of Cook Inlet. The most important of these

TABLE 5. Winter Survey of Waterfowl and
Seabirds of Lower Cook Inlet
Feb. 9, 10 and 18, 1976

The following is a breakdown of the number of birds observed in the major bay located within the surveyed areas plus the combined total of all Lower Cook Inlet

<u>LOCATION</u> (East side of Cook Inlet)	<u>No. of birds</u>
Takoma Cove	
Goldeneze	20
Harlequin duck	16
Unid. sea duck	1
Bufflehead	12
Cormorant	3
Glaucous-winged Gull	7
Sunday Bay	
Goldeneze	2
Oldsquaw	42
Harlequin	3
Unid. sea duck	11
Bufflehead	17
Merganser	2
Small alcid	1
Glaucous-winged Gull	18
Mew Gull	2
Unid. gull	3
Loon	2
Cormorant	1
Mature Bald Eagle	1
Taylor Bay	
Goldeneze	4
Oldsquaw	1
Harlequin	4
Unid. sea duck	15
Bufflehead	18
Merganser	1
Small shorebirds	40
Small alcids	11
Mew Gull	2
Glaucous-winged Gull	24
Unid. gull	3

Taylor Bay, Con't.

Cormorant	6
Northwest Crow	4
Mature Bald Eagle	3
Immature Bald Eagle	1

West Arm Port Dick

Goldeneze	259
Unid. bay ducks	15
Harlequin	82
White-winged Scoter	2
Surf Scoter	59
Unid. Scoter	50
Unid. sea duck	51
Mallard	107
Unid. dabblers	40
Bufflehead	5
Red-breasted Merganser	9
Unid. Merganser	16
Small alcid	7
Mew Gull	4
Glaucous-winged Gull	2
Loon	2
Cormorants	23
Mature Bald Eagle	5
Immature Bald Eagle	1

Rocky Bay

Goldeneze	232
Oldsquaw	1
Surf Scoters	90
Unid. Scoter	26
Unid. sea duck	13
Bufflehead	44
Unid. Merganser	20
Small shorebird	10
Small alcid	4
Glaucous-winged Gull	5
Cormorant	16
Raven	1
Loon	1
Magpie	2

Windy Bay

Goldeneze	46
Harlequin	11
Surf Scoter	134
Common Scoter	15
Common Eider	216
Unid. Scoter	14

Windy Bay, Con't.

Unid. sea duck	11
Mallard	15
Bufflehead	9
Unid. Merganser	6
Small shorebirds	30
Small alcid	3
Grebe	1
Cormorant	1
Magpie	1
Mature Bald Eagle	1

Chugach Bay

Harlequin	10
Surf Scoter	308
Common Scoter	45
Unid. Scoter	65
Unid. sea duck	64
Bufflehead	1
Red-breasted Merganser	4
Small alcid	1
Grebe	1
Glaucous-winged Gull	1
Cormorant	6
Northwest Crow	3

East Chugach Island

Harlequin	28
White-winged Scoter	1
Surf Scoter	52
Common Scoter	2
Unid. Scoter	4
Unid. sea duck	2
Small shorebird	1
Glaucous-winged Gull	2
Cormorant	89
Northwest Crow	54

Perl Island (seaward side only)

Unid. Scoter	10
Unid. sea duck	2
Cormorant	48
Northwest Crow	10

Elizabeth Island

Harlequin	19
Surf Scoter	2
Common Scoter	7

Elizabeth Island, Con't.

Unid. Scoter	31
Unid. sea duck	6
Unid. Merganser	1
Small shorebird	23
Loon	1
Cormorant	25
Northwest Crow	26
Mature Bald Eagle	1

Port Chatham

Scaup	10
Goldeneze	128
Harlequin	36
Surf Scoter	122
Common Scoter	26
Unid. Scoter	22
Unid. sea duck	24
Mallard	232
Bufflehead	27
Red-breasted Merganser	9
Common Merganser	2
Small shorebird	50
Small alcid	1
Greb	1
Glaucous-winged Gull	12
Loon	4
Cormorant	17
Magpie	4
Mature Bald Eagle	1
Immature Bald Eagle	1

Koyukotolik Bay

Scaup	40
Goldeneze	123
Harlequin	50
Surf Scoter	42
Common Scoter	23
Common Eider	71
Unid. Scoter	176
Unid. sea duck	1
Mallard	95
Bufflehead	11
Red-breasted Merganser	5
Small alcid	1
Glaucous-winged Gull	2
Loon	3
Cormorant	4
Northwest Crow	25
Mature Bald Eagle	1

Port Graham

Goldeneze	176
Unid. duck	4
Oldsquaw	2
Harlequin	39
White-winged Scoter	1
Surf Scoter	11
Common Scoter	2
Common Eider	16
Unid. Scoter	52
Unid. sea duck	13
Bufflehead	26
Red-breasted Merganser	27
Common Merganser	3
Unid. Merganser	4
Medium-size shorebird	150
Glaucous-winged Gull	2
Cormorant	5
Northwest Crow	13

Seldovia Bay

Scaup	68
Goldeneze	93
Unid. duck	19
Oldsquaw	46
Harlequin	11
White-winged Scoter	8
Surf Scoter	26
Common Scoter	2
Common Eider	4
Unid. Scoter	70
Bufflehead	16
Red-breasted Merganser	2
Unid. Merganser	6
Medium-sized shorebird	1
Small alcid	4
Mew Gull	5
Glaucous-wing Gull	1
Cormorant	7

Kasitsna Bay

Scaup	26
Goldeneze	31
Unid. duck	4
Oldsquaw	3
Harlequin	3
White-winged Scoter	2
Surf Scoter	48
Unid. Scoter	28
Bufflehead	70

Kasitsna Bay, Con't.

Small alcid	3
Glaucous-winged Gull	1
Cormorant	1
Northwest Crow	40

Jakolof Bay

Scaup	2
Goldeneze	33
Unid. duck	21
Harlequin	33
Surf Scoter	27
Common Eider	3
Unid. Scoter	17
Bufflehead	6
Red-breasted Merganser	1
Unid. Merganser	1
Loon	2
Raven	3

Tutka Bay (shoreward side only)

Goldeneze	166
Unid. duck	74
Oldsquaw	3
Harlequin	51
Surf Scoter	136
Unid. Eider	2
Unid. sea duck	22
Red-breasted Merganser	13
Unid. Merganser	17
Small alcid	1
Greb	1
Cormorant	2
Magpie	5
Mature Bald Eagle	1

Sadie Cove

Goldeneze	111
Unid. bay duck	18
Unid. duck	24
Oldsquaw	2
Harlequin	61
White-winged Scoter	43
Surf Scoter	70
Common Eider	12
Unid. Scoter	46
Mallard	18
Bufflehead	5
Red-breasted Merganser	1

Sadie Cove, Con't..

Unid. Merganser	1
Small alcid	84
Large alcid	1
Mew Gull	1
Loon	20
Cormorant	8
Mature Bald Eagle	2

China Poot Bay

Goldeneye	333
Unid. duck	38
Harlequin	4
White-winged Scoter	5
Surf Scoter	520
Unid. Eider	1
Unid. Scoter	503
Unid. sea duck	6
Mallard	898
Bufflehead	3
Red-breasted Merganser	5
Small shorebird	420
Mew Gull	21
Glaucous-winged Gull	8
Cormorant	1
Raven	9
Northwest Crow	111
Magpie	1
Mature Bald Eagle	7
Immature Bald Eagle	3

Peterson Bay

Goldeneze	61
Unid. duck	26
Oldsquaw	5
Harlequin	1
Mallard	7
Red-breasted Merganser	8
Small alcid	2
Cormorant	3

Halibut Cove

Goldeneye	311
Unid. ducks	25
Oldsquaw	16
Harlequin	6
Surf Scoter	77
Common Scoter	14
Unid. Scoter	161
Mallard	69

Total for Kachemak Bay, Con't.

Northwest Crow	277
Mature Bald Eagle	17
Immature Bald Eagle	4

LOCATION (west side Cook Inlet)

Redoubt Bay

Oldsquaw	1
Glaucous-winged Gull	2

Tuxedni Bay

Oldsquaw	6
Unid. sea duck	137
Large shorebirds	1,600
Glaucous-wing Gull	2

Tuxedni Channel

Oldsquaw	4
Large shorebirds	11,775
Magpie	1

Chinitna Bay

Oldsquaw	2
----------	---

Oil Bay

Goldeneze	1
Oldsquaw	6
Unid. sea ducks	12
Raven	2

Iniskin Bay

Oldsquaw	805
Unid. sea ducks	87

Cottonwood Bay

Oldsquaw	4
Unid. sea duck	4

Iliamna Bay

Oldsquaw	104
Small alcid	1

Ursus Cove

Oldsquaw	60
Unid. sea duck	45

Bruin Bay

Oldsquaw	24
Small alcid	4
Pelagic Cormorant	2
Northwest Crow	2

Kamishak Bay

Oldsquaw	247
Unid. sea ducks	51
Small alcid	1
Northwest Crow	1

Totals for all Lower Cook Inlet

Scaup	147
Goldeneye	2,646
Unid. duck	752
Oldsquaw	1,911
Harlequin	734
White-winged Scoters	77
Surf Scoters	2,135
Common Scoters	410
Common Eider	349
Unid. Eider	5
Unid. Scoter	2,719
Mallard	1,445
Unid. dabblers	40
Bufflehead	307
Red-breasted Merganser	146
Common Merganser	5
Unid. Merganser	92
Small shorebirds	490
Medium shorebirds	162
Large shorebirds	3,375
Small alcid	699
Large alcid	47
Gillimot	1
Grebe	5
Mew Gull	288
Glaucous-winged Gull	413
Unid. Gull	662
Loon	53
Cormorant	440
Raven	17
Northwest Crow	445
Magpie	11
Mature Bald Eagle	35
Immature Bald Eagle	8

Total Waterfowl - 13,920

236

21,071

Table 6. Ducks and geese found in bays in Lower Cook Inlet by aerial survey.

<u>Location</u>	<u>8-25-69</u>	<u>9-9-69</u>	<u>10-2-69</u>	<u>4-16-70</u>	<u>6-1-70</u>	<u>8-12-70</u>	<u>9-28-70</u>	<u>2-9-71</u>	<u>5-12-71</u>	<u>10-5-71</u>	<u>11-3-72</u>
Redoubt Bay	1626	2632	2630	1170		1917	2587			3531	
Kalgin Island				50	39	71					
Fox River Flats								915	1650		1950
Aurora Lagoon								50	0		334
Halibut Cove								185	250		408
China Poot Bay								110	0		682
Neptune Bay											18
Sadie Cove								56	5		
Tutka Bay								165			
Kasitsna Bay											390
Jackolof Bay								160			
Seldovia								195	128		
Port Graham								208	1025		

TABLE 7 Winter and Spring Survey of
Waterfowl and Seabirds along the Shoreline of
Kachemak Bay

Feb. 18 and May 3, 10, 1976

The survey was conducted by the Department of Fish and Game utilizing a de Havilland "Beaver" with Paul Arneson, Game Biologist III, Warren Ballard, Game Biologist II and David Erickson, Technician III, as observers.

The area survey included all birds from the storm zone on the beach to a distance of 200 M on the seaward side of the aircraft. The height above the water was 100 feet.

The following is a breakdown of the species and number found in Kachemak Bay.

<u>Species</u>	<u>Number</u>	
	<u>Winter</u>	<u>Spring</u>
Greater Scaup	97	2,730
Goldeneye	1,791	894
Unid. Bay Ducks	18	---
Unid Ducks	348	167
Oldsquaw	430	1,026
Harlequin	315	505
White-winged Scoter	70	724
Surf Scoter	1,195	3,433
Common Scoter	289	1,367
Common Eider	48	89
Steller's Eider	---	8
Unid. Eider	5	10
Unid. Scoter	1,993	669
Unid. sea duck	176	58
Mallards	996	214
Pintail	---	334
Green-wing Teal	---	24
Widgeon	---	89
Unid. dabblers	---	151
Bufflehead	158	170
Red-breasted Merganser	51	85
Common Merganser	1	94
Unid. Merganser	35	---
Small Shorebirds	747	4,553
Medium Shorebirds	1	808
Large Shorebirds	---	6
Marbled Murrelets	---	8
Common Murrelets	---	20
Guillemot	---	158
Common Loon	---	14
Unid. Loon	---	38

Table 7 Cont'd.

<u>Species</u>	<u>Number</u>	
	<u>Winter</u>	<u>Spring</u>
Horned Grebe	---	12
Unid. Grebe	---	25
Bonaparte's Gull	---	42
Mew Gull	268	442
Glaucous-winged Gull	306	1,854
Herring Gull	---	32
Unid. Gull	608	1,942
Pelagic Cormorant	---	7
Double-crested Cormorant	---	12
White-flanked Cormorant	---	10
Unid. Cormorant	51	143
Black Brant	---	2
Lesser Canadian Geese	---	1,033
Immature Bald Eagle	---	2
Mature Bald Eagle	---	5
Northwestern Crow	---	73
Raven	---	2
<hr/>		
Total	9,997	24,085
<hr/>		
Total Waterfowl	8,016	12,842

Table 8.

Ducks and geese found in bays of the south side of the Alaska Peninsula by aerial survey.

<u>Location</u>	<u>Date of Survey</u>	
	<u>3/20-23/70</u>	<u>10/11-12/72</u>
Puale Bay		685
Portage Bay		184
Wide Bay	462	631
Agripina Bay area	465	200
Chiginagak Bay area	505	352
Yantarni Bay area	623	141
Amber Bay	465	240
Aniakchak Bay	1145	449
Cape Kumlik	198	
Sutwik Island	263	
Kujulik Bay	3915	391
Cape Kumlin	250	
Hood Bay	20	
Chignik Bay	430	35
Chignik Lagoon		1153
Castle Bay	95	287
Castle Cape to Seal Cape	65	
Kuiukta Bay	5	
Mitrofanina Bay & Island	38	
Ivanof Bay	65	1043
Stepovak Bay	42	862
Grub Gulch Bay		241
Clark Bay		104
Orzinski Bay	124	85
American Bay		62
Chichagof Bay		76
Dorenoi Bay	295	32
Balboa Bay	510	
Beaver Bay	123	224
Shumagin Islands	4086	
Canoe Bay		1362
Pavlof Bay		715
Pavlof Islands	1118	
Deer Island	345	
Sandman Reefs	412	
Sanak Islands	2762	
Cold Bay	462	3057
Morzhovoi Bay	2925	4439
Otter Cove	434	

Table 9. Ducks and geese found in bays of Kodiak Island by aerial survey.

Location	Date of Survey						
	1-19-66	2-11-66	3-14-66	11-11-66	3-12-69	1-21-71	2-18-72
Sharatin Bay			30		2	175	
Kizhuyak Bay			149		4	79	
Settler Cove					8		
Spruce Bay					75		
Viekoda Bay			2		30	85	
Terror Bay	270	385	616	288	102	155	
Uganik Island			231		23		
N. E. Arm Uganik	573	392	205	229	125	576	
E. Arm Uganik			489				
S. Arm Uganik			15				
Spiridon Bay			101		6	138	
Zachar Bay	111	668	470	612	235	1058	
Larsen Bay	197		6	184			
Uyak Bay	991	1237	1378	1325	490		
Karluk Lagoon			90				
Sturgeon Lagoon					235		
Halibut Bay					75		
Sukoi Lagoon					300		
Alitak Lagoon					150		85
Tugidak Island					600		390
Sitkanak Lagoon					50		
Deadman Bay							125
Olga Bay							170
Portage Bay					75		145
Kaiugnak Bay					175		175
Three Saints Bay							310
Barling Bay					100		50
Midway Bay					30		120
Amee Bay					15		
Port Holbron					8		
McDonald Lagoon					45		
Hidden Basin	NOT SURVEYED	NOT SURVEYED	NOT SURVEYED		123		
Kiliuda Bay					410		528
Shearwater Bay					130		
Gull Cape							75
Eagle Harbor					50		
Ugak Bay						469	
Saltery Cove					60		
Pasagshak Bay						125	
Narrow Cape						258	
Chiniak Cape						257	
Kalsin Bay				35		360	
Middle Bay			261	175		181	
Women's Bay			30			375	
Monashka Bay					160		

Table 10. Marine bird survey via M/V Aleutian Tern by Kodiak National Wildlife Refuge personnel, Jan. 25-Feb. 8, 1973 and Feb. 5-22, 1975.

	<u>1973</u>	<u>1975</u>
Loon sp.	424	83
Grebe sp.	7	72
Red-necked	1	
Cormorant sp.	1982	1728
Emperor Geese	621	52
Mallard	700	2556
Pintail	200	4
Gadwall	30	75
Dabbler sp.	-	50
Scaup (Greater)	80	15
Goldeneye sp.	1142	1205
Common	146	
Barrows	24	30
Bufflehead	36	27
Harlequin	691	675
Eider sp.	67	1745
Common	4512	58
King		4654
Steller's	340	1176
Old squaw	7863	9410
Scoter sp.	3192	984
Black	2154	1402
White-winged	3059	2073
Surf	1194	327
Merganser sp.	39	27
Common	21	21
Red-breasted	13	34
Hawk sp.		3
Marsh		1
Bald Eagle age?	4	8
Adult	183	179
Immature	37	50
Golden Eagle		1
Sandpiper sp.		50
Gull sp.	124	1589
Glaucous-winged	32	923
Mew	356	731
Murre sp.	8420	14,994
Common		179
Thick-billed	66	
Pigeon Guillemot	46	106
Horned Puffin		1
Tufted Puffin		1
Crested Auklet	15,083	7011
Murrelet sp.	63	280
Ancient	3	
Magpie	28	84
Raven	8	3
Crow	524	879

areas are: Chickaloon Flats, Portage Flats, Potter Marsh, Eagle River Flats, Palmer Hay Flats, Goose Bay, Susitna Flats, Trading Bay and Redoubt Bay. Large numbers of migrant waterfowl can also be found in Kachemak Bay on the Fox River Flats and in some of the smaller bays on the south side of Kachemak Bay. Kamishak Bay on the west side of Cook Inlet is also a heavily used waterfowl and shorebird migration stopping area. Birds utilizing Kamishak Bay have followed the coastal route from the lower Pacific flyway wintering grounds. Many of these birds will cross the Alaska Range and fly up Lake Iliamna to more interior and western Alaska breeding grounds. Other areas of lesser importance to waterfowl, but of local importance to birdviewers include the Kenai River and Kasilof River Flats on the east side of Cook Inlet. All of the above areas mentioned receive heavy bird use during both spring and fall periods.

In Tables 6, 7 and 8 various waterfowl surveys conducted in lower Cook Inlet and on the south side of Alaska Peninsula are summarized for both spring and fall periods. Complete coverage was not made for most surveys in some areas so these figures must be considered very minimum. Relatively few surveys have been made on Kodiak Island during spring and fall migration periods. However, all bays and estuaries which have a small salt marsh or intertidal land are undoubtedly used by substantial numbers of ducks, geese, shorebirds and other birds. A general assumption is that the larger the salt marsh or intertidal area exposed, the greater number and diversity that will occur. Some species that frequent the Kodiak-Afognak Islands in the spring, such as black brant, bypass the island in their southerly fall migration. Black brant during the fall are extremely rare, but during the spring perhaps several tens of thousands use a number of bays and estuaries in the island group.

RARE AND ENDANGERED SPECIES

Arctic Peregrine Falcon are classified rare and endangered by the Federal Government and the State of Alaska. Although Arctic Peregrines do not nest in the Cook Inlet-Kodiak region, some birds are known to utilize the coastal areas during spring and fall migration periods on their way to and from wintering grounds to the south. Probably any area in Cook Inlet could receive use by small numbers of Arctic Peregrines, however, they would be uncommon on Kodiak Island.

Although no endangered waterfowl species have been verified in the Cook Inlet-Kodiak region, there is a strong possibility that the Aleutian Canada goose may occur there, especially on Kodiak Island. The Aleutian Canada is a small goose with a wide white neck ring at the base of its black neck. The entire world population (Spring population of about nine hundred birds) apparently breeds on Buldir Island in the Western Aleutian Islands.

The birds migration route from Buldir Island to Crescent City, California is unknown. It is possible that the geese follow the Gulf Coast during the fall. However, it is most probable that they take this route during spring migration. Many of the small islands around Kodiak and Afognak Islands appear to be a stopping place for Aleutian Canada geese. As more geese are banded in future years, and when radio transmitters are placed on the birds during the fall of 1976, the probability of Aleutian geese being verified in this area increases.

If Aleutian Canada geese are verified, perhaps the most significant event which may occur is that the areas frequented may be judged to be critical and subsequently classified as critical habitat under federal

law. Lands judged to be critical may be purchased, leased or otherwise controlled. It is also against federal law to use federal funds on critical habitat for projects that will adversely affect the geese. This could include such things as roads, airports, logging activities, etc. At this time, the probability of Aleutian geese being verified in this region is high; but the probability of lands being designated critical is low.

CRITICAL HABITAT

The term critical habitat can have very general or very precise connotations. For example, fertile water areas with adjacent nesting cover are critical for production of waterfowl each year. Specifically, a given precise area may be critical to large numbers of birds or even entire species, subspecies, or populations. Critical habitat as will be delineated here is that habitat or land area which is necessary for the survival or well being of large numbers of birds. Critical habitat could also be that area used by rare and endangered species, but no such areas have been identified as yet in the Cook Inlet-Kodiak region.

A given area may be critical to birds during the summer for nesting purposes, but not for example, during the fall or spring for feeding and resting. A given area may be critical for an individual bird, but if that area were removed or adversely altered, the species of which that individual bird is a part may not be affected. Unfortunately, few studies in Alaska have been made which actually identify precisely why an area is critical or very important. We can usually say only that many birds occur where they do and generally why they do occur there.

Intertidal areas with broad mud flats and sedge-grass flats which

flood at higher high tides are, taken as a whole, essential to the survival of many waterfowl, shorebirds and indirectly many seabirds in this region. Exceptions are probably swans which could survive exclusively on upland areas. It is a rational generalization that the bigger such intertidal zones are, the more important they are. One major reason for the intertidal flats importance is the quantity of food which is produced there. Tidal action creates a constant interchange of nutrients and organic matter for plant and animal growth. Freshwater streams are equally also associated with these flats. Brackish water (mixed salt and fresh) is more productive than either salt or fresh water. Varying tide levels create a change of plant and animal communities from mud (most frequently flooded) to grass-sedge and finally spruce forest (never flooded). The species of plants and animals within each "life zone" are often different and thus create very diverse food sources for birds.

It is difficult in most instances to say, for example, that the loss of a given tide flat would result in a number of birds disappearing. In many cases the birds can go elsewhere. However, exactly what the carrying capacity for birds is for any given area of tidal flats would be difficult to determine.

The critical function in the life history of waterfowl which intertidal areas fulfill is that they provide good places for birds to use during the spring and fall, before and after inland nesting areas are ice and snow free. Because the nesting season in Alaska is so short, it is imperative that waterfowl and shorebirds arrive on their breeding grounds ready to nest as soon as conditions allow. If intertidal areas were not available, waterfowl and shorebirds would have to overfly from their wintering grounds to their nesting areas. If such were the case, far fewer waterfowl would be in Alaska than are here today. Likewise

during the fall, intertidal areas serve as a safe resting and feeding area for the birds to gain strength and body fat for their long flight south after their inland nesting areas have become ice covered.

There are a number of areas within the Cook Inlet-Kodiak Region which have some state or federal land protection existing now. There are five areas currently designated as state refuges. These are: the Palmer Hay Flats, Goose Bay, Potter Marsh, Susitna Flats, and the Trading Bay area. The Redoubt Bay area has also been nominated as state refuge, but the current year's legislature did not so designate the area. There are two areas which have critical habitat classification under state law - Kachemak Bay and Kalgin Island. The U. S. Fish and Wildlife Service has land management authority on most of the southern end of Kodiak Island which is in the Kodiak National Wildlife Refuge. Under authority of the Native Land Claims Settlement Act, the Fish and Wildlife Service has requested two additional refuges in this region; the Barren Islands and the Shumagin Islands. All intertidal lands surrounding or adjacent to federal refuges are state owned. There are two additional areas within this region which have special classification. The Chickaloon Flats intertidal lands are owned by the State while the Fish and Wildlife Service and Forest Service currently own the uplands. This area is under cooperative management agreement between the State of Alaska and the two federal managing agencies. On the Portage Flats area the State also owns intertidal lands while the Bureau of Land Management and U.S. Forest Service own most of the upland marsh area. A cooperative management agreement between state and federal managing agencies is currently being drafted by the Bureau of Land Management and this area will eventually be placed in cooperative management status.

Specific Critical Habitats

In this region there are six areas that are critical to the welfare of waterfowl. There are also a number of other areas which can be considered very important to waterfowl and sea birds; the difference between very important and critical could well be a matter of opinion depending on who is designating them as such. The areas we deem critical are the Palmer Hay Flats, Susitna Flats, Trading Bay, Redoubt Bay, the Chickaloon Flats, and Kachemak Bay (Dan Timm, ADF&G, Anchorage).

The Palmer Hay Flats are inside of a line bounded by the mouth of Cottonwood Creek on the southwest, across Knik Arm to Eklutna on the east, and north and westward along the railroad tracks on the east and north, to the base of the bluff bordering the Palmer Hay Flats on the west. Critical area is within this described boundary. This area is deemed critical due to the combination of heavy public use on the area, the waterfowl production which occurs here and the large numbers of birds which use Palmer Hay Flats both spring and fall. These three criteria-public use, waterfowl production and use by migrating waterfowl-are the criteria used to designate all six critical habitats. Numerous inventories of spring and fall waterfowl using the area have been conducted. In the fall it is estimated that over 50,000 ducks, over 10,000 geese and an excess of 15,000 swans (both species) use the Palmer Hay Flats. This use by migrating waterfowl extends from about mid August to October 10. Spring bird populations are more spectacular as larger concentrations occur during a shorter time period. Estimated spring use includes over 100,000 ducks, over 50,000 geese and over 5,000 swans. Spring bird use occurs from about April 10 to about May 10, with peak populations occurring around May 1.

The Susitna Flats includes the area beginning due north of Point Campbell, including all intertidal lands between there and Beluga on the south, and north including all salt marsh below the 100 foot contour. This area is delineated with legal descriptions in the Susitna Flats Refuge Bill which passed the Legislature in 1976. During both the spring and fall seasons estimated total duck use exceeds 150,000 birds; geese exceed 50,000 and over 10,000 swans use the area each year. Not only does this area produce a significant number of ducks, geese and swans each year, but it is also the number one hunting area in Alaska.

Trading and Redoubt Bays include all intertidal lands plus the lowland salt marsh areas north and west of the ocean beach to about the 100 foot contour line. These two areas both produce substantial numbers of waterfowl and sustain moderate hunting pressure. Few spring and fall waterfowl surveys have been conducted on these areas, but numbers of birds are known to be quite substantial. Estimated total duck, goose and swan use is very similar to that received on the Susitna flats.

Chickaloon Flats is bordered by Burnt Island on the east to about Bedlam Creek on the west and includes all tidal lands south to about the 100 foot contour line. This area receives heavy hunting pressure during the fall as described earlier in this report. Extensive spring and fall bird surveys have been conducted here and the estimated total fall waterfowl use includes about 150,000 ducks and about 100,000 geese. Swan use both spring and fall is not great, perhaps 1,000 birds each period. Spring bird use is somewhat less than the fall and includes an estimated 50,000 ducks and 25,000 geese. On certain days during the fall the waterfowl concentrations can be quite spectacular on Chickaloon Flats. During the peak of migration if Portage Pass at the head of

Turnagain Arm becomes clouded in, birds will "pile up" on the Chickaloon Flats. They can number in the tens of thousands for short time periods until the path clears.

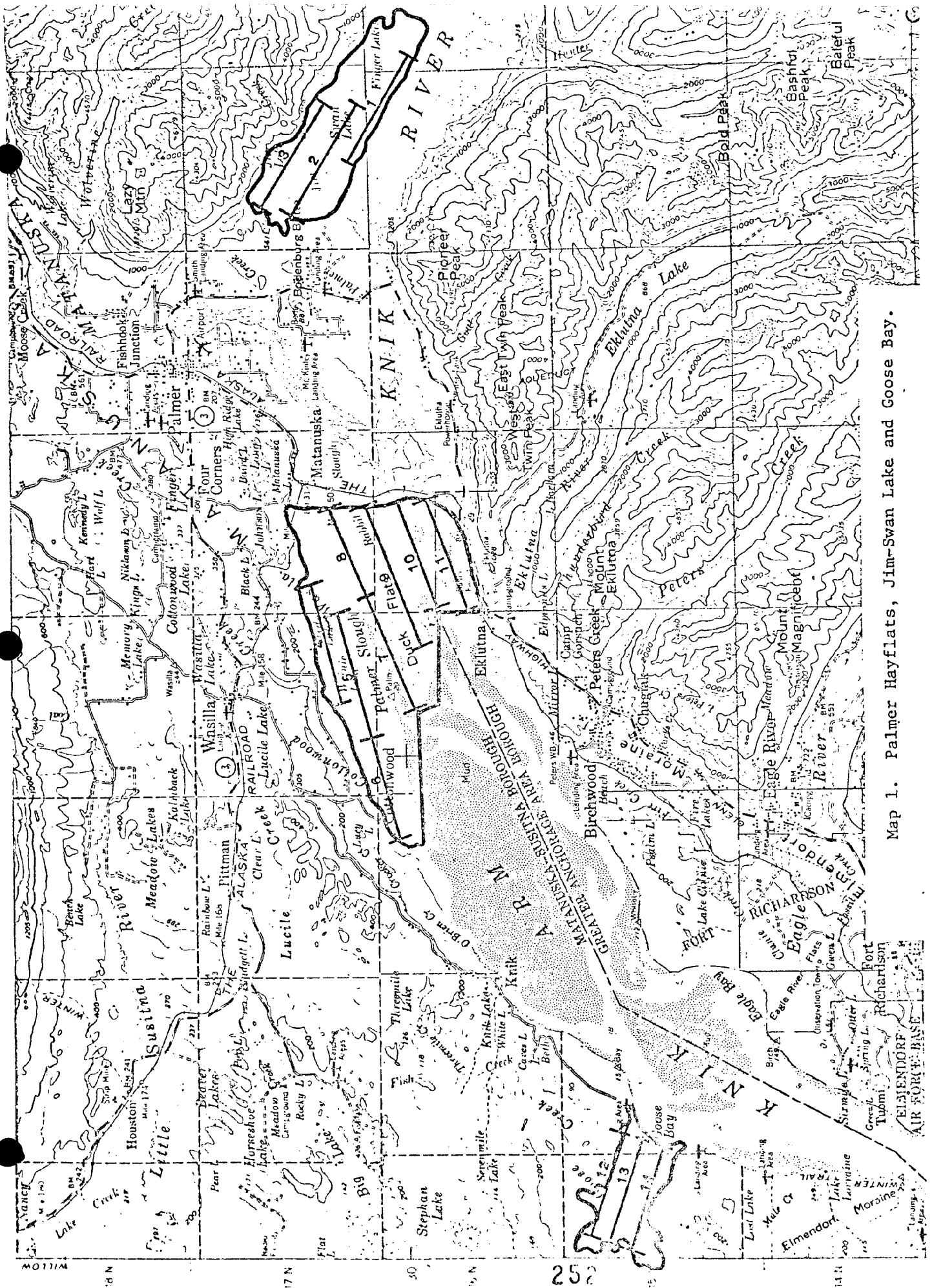
Although the entire Kachemak Bay is considered critical, the intertidal areas of Fox River Flats and the intertidal areas associated with the bays and estuaries on the south side of Kachemak Bay (particularly Chinapoot Bay) are the most valuable areas to waterfowl. Although waterfowl production in Kachemak Bay is low, large numbers of waterfowl utilize these intertidal areas during spring and fall migration. During the 1976 spring migration in early May an estimate was made of one million shorebirds using Fox River Flats on one day. Depending on weather systems, bird concentrations can be very large during the spring and fall. Birds are known to fly directly over the mountains in their migration during spring and fall. During periods of low clouds the piling up of birds can and does occur similar to the phenomenon on Chickaloon Flats. Kachemak Bay also sustains a wintering population of approximately 10,000 waterfowl and other birds.

Other Important Habitats

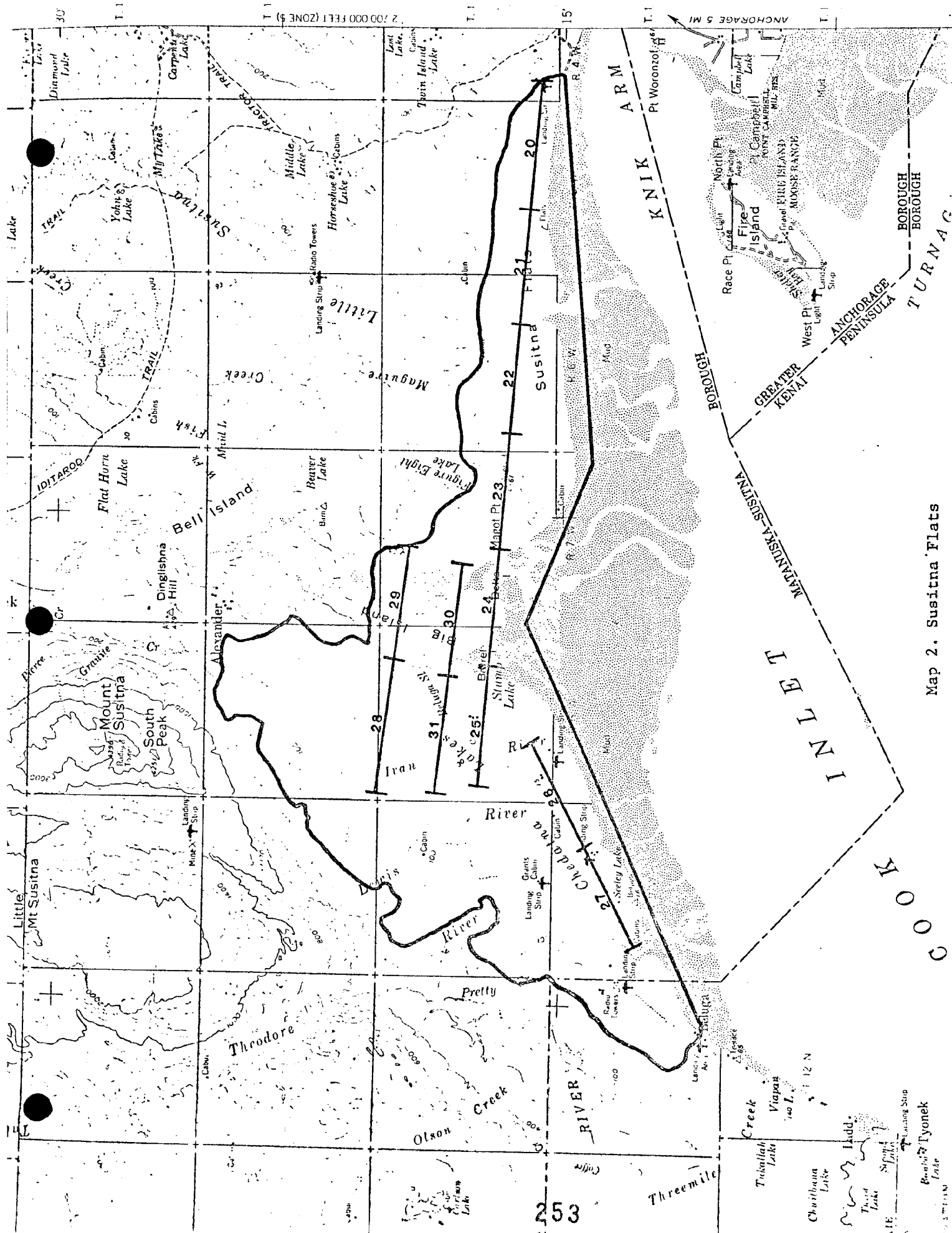
For waterfowl the following areas are very important. These areas generally sustain less public, relatively few birds are annually produced and they receive less bird use during spring and fall migration periods than do the critical habitat areas. These areas are Cordova, Goose Bay, Potter Refuge, Portage Flats, Kenai River Flats, Kasilof River Flats, Kamishak Bay, and all intertidal lands generally located at the heads of bays and estuaries on Kodiak and Afognak Islands. Kamishak Bay could well be a critical habitat area because apparently large numbers of waterfowl

and shorebirds pass through this area on their way to and from Alaska breeding grounds each spring and fall. However, new information on bird numbers will not be available until late Fall 1976. A "piling up" of birds could exist here as exists on the Chickaloon Flats and Fox River Flats, depending on weather conditions.

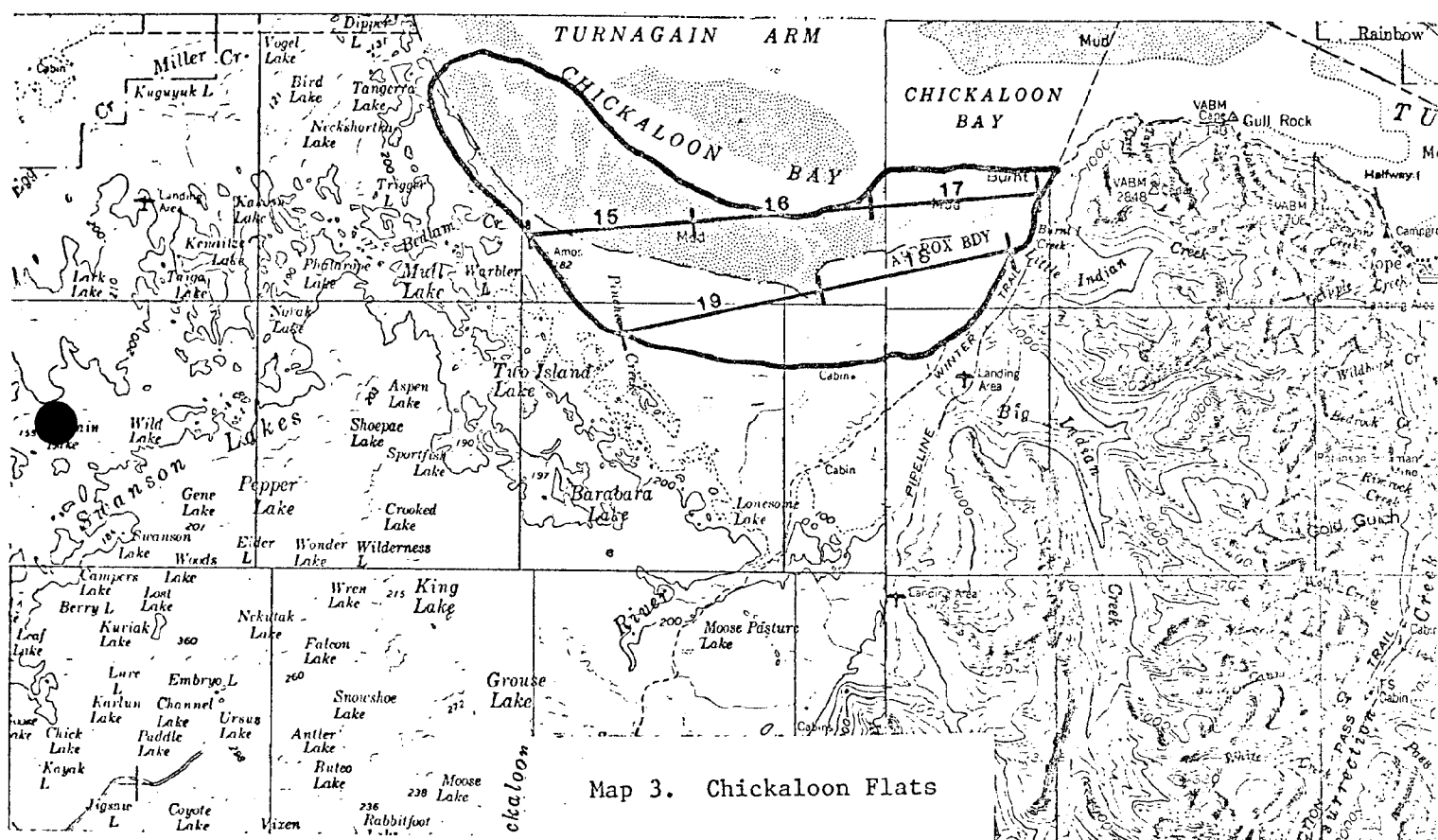
From the seabird standpoint, the Barren Islands, Shumagin Islands, Chirikof Island and Semidi Islands are all very important. Not only are the islands themselves important as nesting areas but the state-owned waters around each island for perhaps a radius of ten or more miles are also important as foraging areas for the birds nesting on each island.

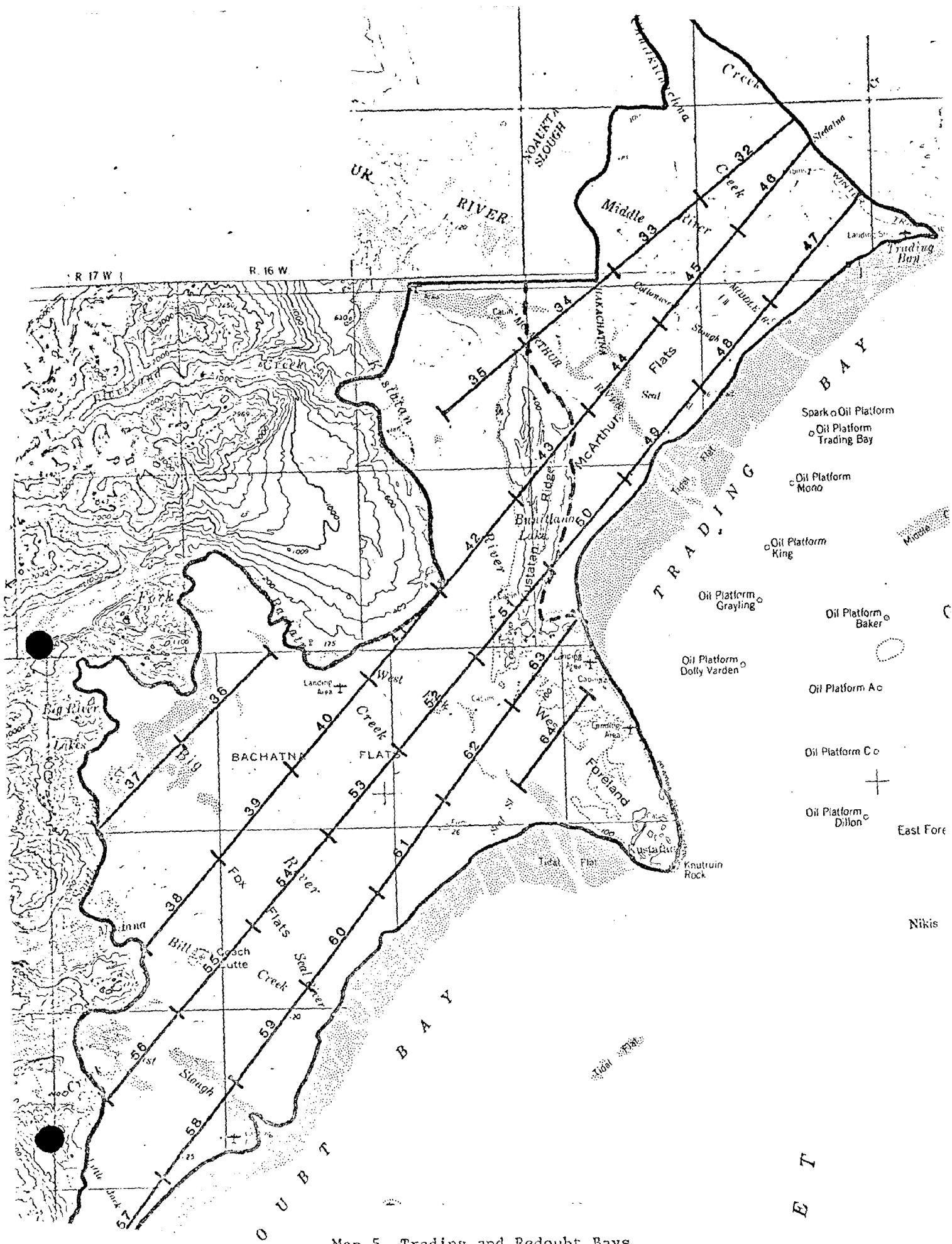


Map 1. Palmer Hayflats, Jim-Swan Lake and Goose Bay.

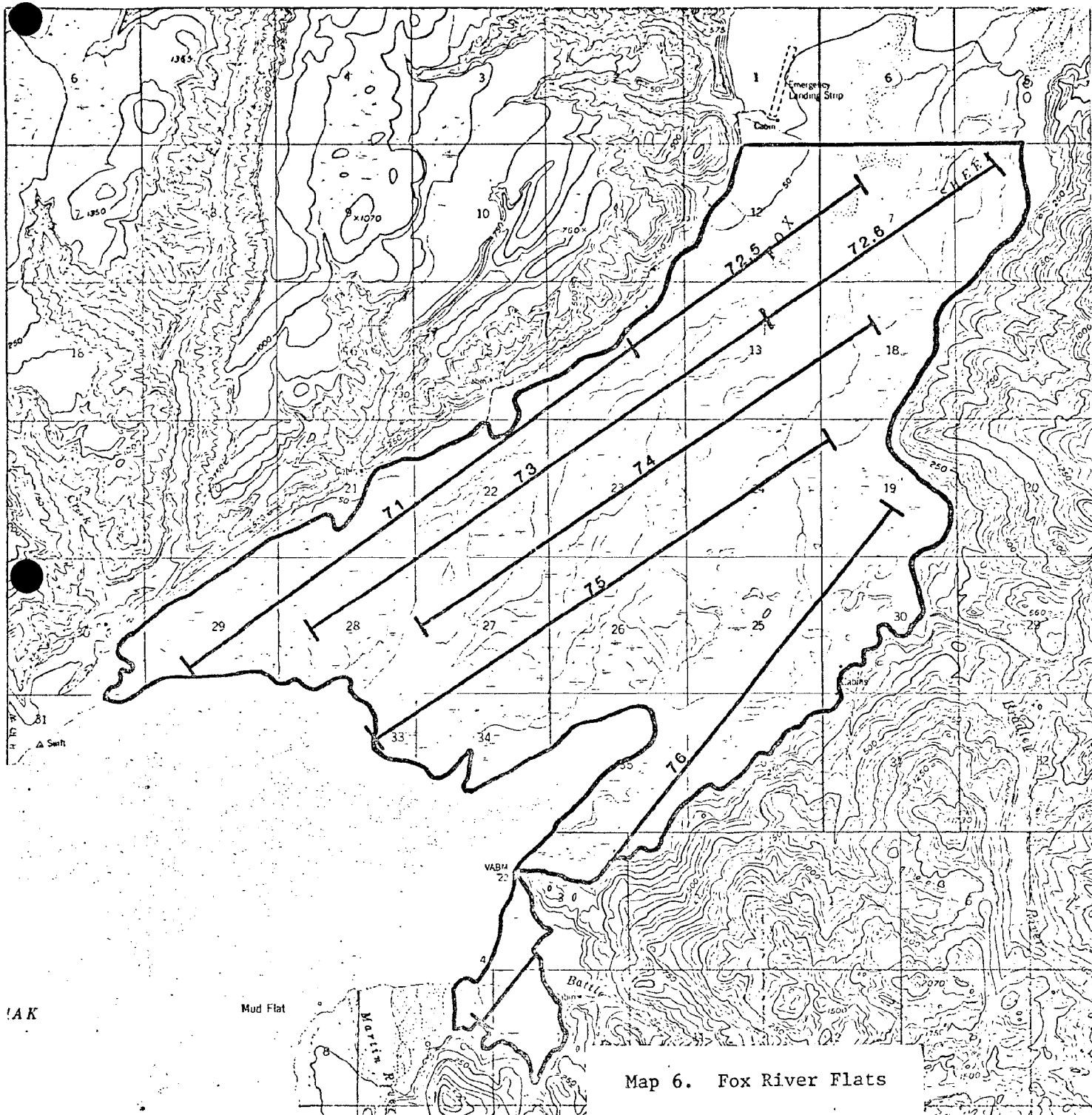


Map 2. Susitna Flats





Map 5. Trading and Redoubt Bays



Map 6. Fox River Flats

MAP NO. COLONY NO. USFWS NO. NAME SPECIES COLONY ESTIMATE NESTING PAIRS NESTS

47-E	241	43009	W. Amatuli Is.	Cormorant	870	
				Glaucous-Winged Gull	2,300	
				Black-Legged Kittiwake	300	
				Common Murre	10	
				Parakeet Auklet	120	
				Horned Puffin	1,300	
				Tufted Puffin	93,000	
				Northern Fulmar	20	
				Cormorant	30	
				Glaucous-Winged Gull	450	
				Black-Legged Kittiwake	13,000	
				Common Murre	61,000	
				Pigeon Guillemot	50	
				Parakeet Auklet	120	
				Horned Puffin	13,000	
				Tufted Puffin	95,000	
				Cormorant	240	
				Glaucous-Winged Gull	1,600	
				Pigeon Guillemot	16	
				Horned Puffin	600	
				Tufted Puffin	9,500	
				Red-Faced Cormorant	70	
				Glaucous-Winged Gull	500	
				Pigeon Guillemot	20	
				Parakeet Auklet	20	
				Rhinoceros Auklet	1,000	
				Horned Puffin	400	
				Tufted Puffin	1,000	
				Cormorant	50	
				Horned Puffin	40	
				Tufted Puffin	1,000	
				Cormorant	50	
				Horned Puffin	40	
				Tufted Puffin	1,000	

NAP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
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47-E	246	43008	Ushagat Is.	Cormorant	200		
				Glaucous-Winged Gull	240		
				Pigeon Guillemot	100		
				Parakeet Auklet	10		
				Horned Puffin	250		
				Tufted Puffin	100		
	247	43002	Middle Latax Rock	Cormorant	250		
				Glaucous-Winged Gull	200		
	248	43003	North Latax Rock	Sea Birds	Present		
	249	43001	South Latax Rock	Glaucous-Winged Gull	500		
				Pigeon Guillemot	400		
	250	43004	Douglas Reef	Glaucous-Winged Gull	200		
46-E	251	42011	Unnamed Is.	Glaucous-Winged Gull	100		
	252	42010	Aguchik Is.	Bald Eagle			1
	253	42008	Cape Gull	Cormorant	100		
				Glaucous-Winged Gull	100		
				Black-Legged Kittiwake	50		
	254	42007	Gull Reef	Cormorant	75		
				Glaucous-Winged Gull	100		
	255	42006	Geographic Harbor	Glaucous-Winged Gull	150		
	256	42005	Unnamed Is.	Cormorant	Present		
	257	42003	Unnamed Is.	Cormorant	Present		
	258	42002	Cape Ilkruitak	Cormorant	150		
				Glaucous-Winged Gull	600		
				Tufted Puffin	1,000		

MAP NO. COLONY NO. USFWS NO. NAME SPECIES COLONY ESTIMATE NESTING PAIRS NESTS

46-E	259	42001	Mount Pedmar	Cormorant	50		
				Glaucous-Winged Gull	200		
40-E	260	36012	Kelp Point	Glaucous-Winged Gull	50		
	261	36011	Mt. Becharof	Horned Puffin	Present		
	262	36010	Kanatak Lagoon	Glaucous-Winged Gull	3,000		
	263	36009	Cape Iguak	Glaucous-Winged Gull	3,000		
	264	36008	Slaughter Is.	Glaucous-Winged Gull	1,700		
	265	36007	Wide Bay	Cormorant	600		
	266	36006	Imuya Bay	Glaucous-Winged Gull	100		
	267	36005	Cape Kilokak	Cormorant	150		
				Glaucous-Winged Gull	150		
				Tufted Puffin	1,300		
	268	36004	Agripina Bay	Cormorant	100		
				Glaucous-Winged Gull	300		
				Horned Puffin	300		
	269	36003	Ashliak Is.	Glaucous-Winged Gull	500		
				Horned Puffin	5,000		
				Tufted Puffin	20,000		
	270	36002	David Is.	Cormorant	1,000		
				Glaucous-Winged Gull	1,000		
				Horned Puffin	4,000		
				Tufted Puffin	12,000		
	271	36001	Poltava Is.	Cormorant	500		
				Glaucous-Winged Gull	1,000		
				Horned Puffin	2,000		
				Tufted Puffin	5,000		

MAP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
39-E	272	35002	Gull Is.	Mew Gull	100		
	273	35018	Bear Is.	Cormorant	Present		
	274	35016	Cape Kubugaki	Cormorant	Present		
				Glaucous-Winged Gull	Present		
	275	35014	Alinchak Bay	Pigeon Guillemot	50		
				Tufted Puffin	500		
	276	35012	Puale Rocks	Cormorant	1,200		
				Glaucous-Winged Gull	1,000		
				Murre	200		
				Horned Puffin	1,500		
				Tufted Puffin	10,000		
	277	35010	Cape Aklek	Horned Puffin	4,000		
	278	35008	Oil Creek	Cormorant	2,000		
				Murre	200,000		
	279	35005	Cape Unalishaguak	Glaucous-Winged Gull	2,000		
				Black-Legged Kittiwake	3,000		
				Murre	275,000		
				Horned Puffin	2,000		
	280	35004	Jute Is.	Glaucous-Winged Gull	2,500		
				Tufted Puffin	15,000		
	281	35003	Portage Bay	Cormorant	3,000		
38-D	282	34009	East Boulder Bay	Black-legged Kittiwake	Present		
	283	34001	Kivak Benchmark	Black-Legged Kittiwake	Present		
				Glaucous-Winged Gull	Present		
	284	34017	Queer Is.	Sea Birds	Present		
	285	34031	Ram Site	Pelagic Cormorant	15		

NAP NO. COLONY NO. USFWS NO. NAME SPECIES COLONY ESTIMATE NESTING PAIRS NESTS

38-D	286	34030	Blow Benchmark	Double-Crested Cormorant	15		
	287	34036	Otmeloi Point	Cormorant	2		
				Glaucous-Winged Gull	5		
				Tufted Puffin	30		
	288	34037	Low Is.	Cormorant	10		
				Glaucous-Winged Gull	10		
				Black-Legged Kittiwake	50		
				Horned Puffin	10		900
				Tufted Puffin			
	289	34044	Whale Is.	Black-Legged Kittiwake	3,000		
	290	34045	Treeless Is.	Cormorant	400		
				Tufted Puffin	130		
	291	34042	Chernof Point	Horned Puffin	7		
	292	34028	Barbara Cove Pt.	Cormorant	40		
				Black-Legged Kittiwake	1,300		
	293	34029	Trout Benchmark	Black-Legged Kittiwake	120		
	294	34021	Reef Two	Cormorant	20		
				Glaucous-Winged Gull	30		200
				Tufted Puffin			
	295	34027	Barbara Cove	Cormorant	15		
				Glaucous-Winged Gull	20		
				Tufted Puffin	25		
	296	34034	Nangolka Pt.	Glaucous-Winged Gull	100		
	297	34035	Nangolka Pt. Is.	Cormorant	40		
				Glaucous-Winged Gull	120		
				Black-Legged Kittiwake	1,500		
				Horned Puffin	4		
				Tufted Puffin	1,800		

MAP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
38-D	298	34026	Uganik Passage	Cormorant	5		
				Glaucous-Winged Gull	470		
				Black-Legged Kittiwake	850		
				Tufted Puffin	690		
299	34025		Gull Light	Cormorant			5
				Glaucous-Winged Gull	50		
				Tufted Puffin			15
300	34023		Rock Pt.	Cormorant	25		
301	34048		Uganik Bay Islets	Black-Legged Kittiwake	300		
				Tufted Puffin	220		
302	34024		Village Is.	Cormorant	335		
				Glaucous-Winged Gull	962		
				Black-Legged Kittiwake	25		
				Pigeon Guillemot	10		
				Tufted Puffin	2,095		
303	34039		South Noisy Is.	Cormorant	70		
				Glaucous-Winged Gull	160		
				Black-Legged Kittiwake	100		
				Horned Puffin	7		
				Tufted Puffin	2,500		
304	34038		North Noisy Is.	Cormorant	100		
				Glaucous-Winged Gull	1,100		
				Black-Legged Kittiwake	1,100		
				Tufted Puffin	14,000		
305	34020		Chief Point	Black-Legged Kittiwake	Present		
306	34012		Carlsen Point	Sea Birds	Present		
307	34011		Alf Is.	Black-Legged Kittiwake	Present		

MAP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
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37-B	308	33001	Cape Kiavak	Cormorant	Present		
36-B	309	32002	Geese Is.	Cormorant Glaucous-Winged Gull	Present Present		
	310	32001	Sundstrom Is.	Glaucous-Winged Gull Tufted Puffin	500 800		
	311	-	Tugidak Is.	Cormorant	100		
35-E	312	31001	South Is.	Northern Fulmar Black-Legged Kittiwake Murres	5,000 30,000 50,000		
	313	31029	Navy Is.	Cormorant Glaucous-Winged Gull Horned Puffin Tufted Puffin	150 300 1,200 3,500		
	314	31027	Derickson Is.	Cormorant Horned Puffin	60 100		
	315	31028	Chiginagak Bay	Glaucous-Winged Gull Horned Puffin Tufted Puffin	590 2,000 15,000		
	316	31026	Unnamed Is.	Black-Legged Kittiwake	Present		
	317	31025	Cape Kuyuyukak	Cormorant Glaucous-Winged Gull Black-Legged Kittiwake Murres Tufted Puffin	500 1,400 17,000 9,000 2,000		

MAP NO. COLONY NO. USFWS NO. NAME SPECIES COLONY ESTIMATE NESTING PAIRS

35-E	318	31024	Central Is.	Horned Puffin Tufted Puffin	3,000 90,000	
	319	31022	Ugaiushak Is.	Pelagic Cormorant Glaucous-Winged Gull Black-Legged Kittiwake Murre Horned Puffin Tufted Puffin Common Eider	600 2,500 7,000 13,000 14,000 10,000 300	
	320	31020	Hydra Is.	Tufted Puffin	4,500	
	321	31023	Unnamed Is.	Glaucous-Winged Gull Pigeon Guillemot Horned Puffin Tufted Puffin	400 3,000 2,000 5,000	
	322	31021	Unnamed Is.	Glaucous-Winged Gull Pigeon Guillemot Horned Puffin Tufted Puffin	300 300 500 7,000	
	323	31016	Foggy Cape	Cormorant Glaucous-Winged Gull	300 400	
	324	31015	Volcanic Dike	Glaucous-Winged Gull	700	
	325	31014	South Sutnik Is.	Glaucous-Winged Gull	200	
	326	31019	Garden Is.	Glaucous-Winged Gull	500	
	327	31018	Kunuk Is.	Sea Birds	Present	
	328	31017	Cape Kumlik	Tufted Puffin	2,000	

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